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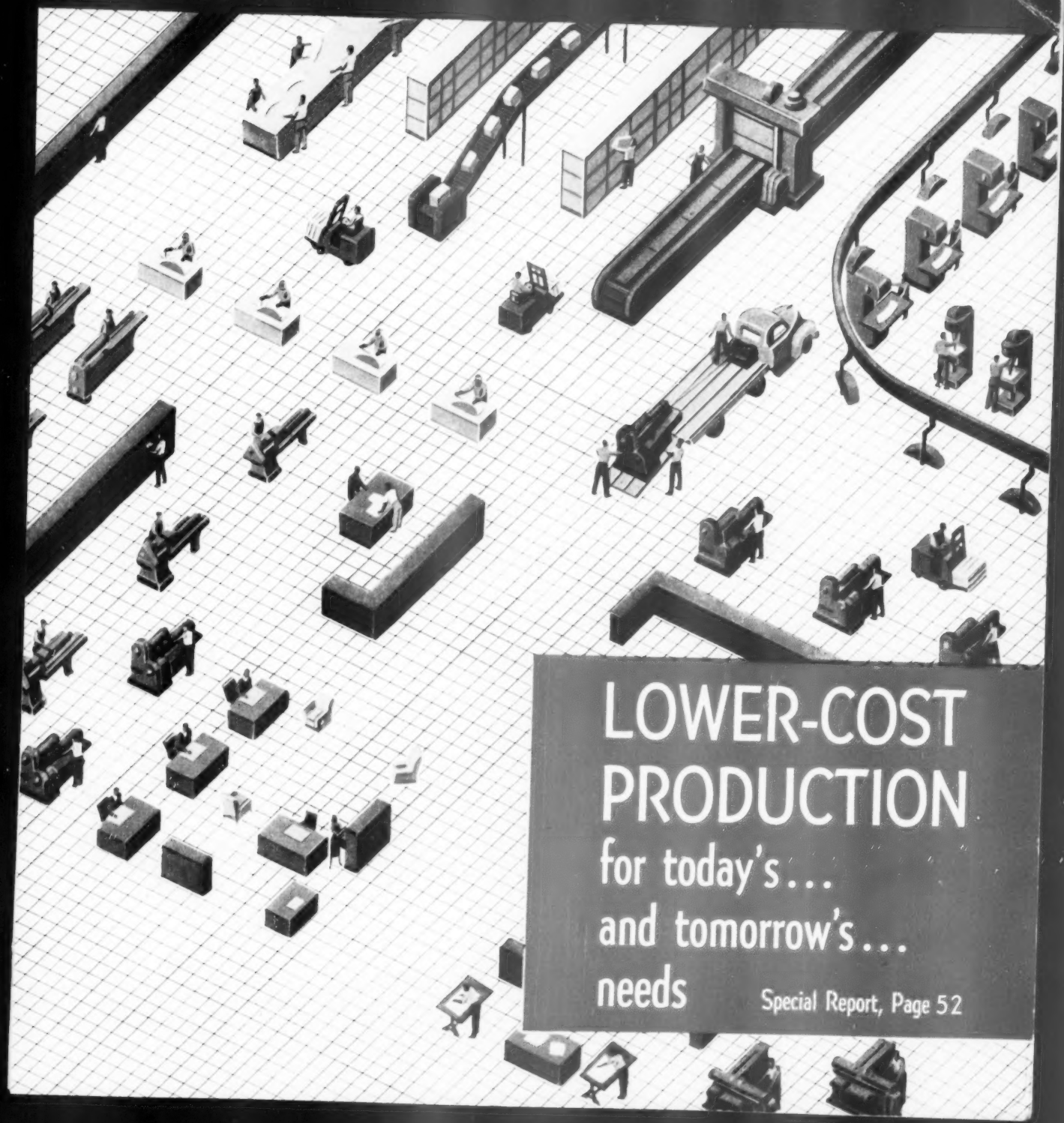
FACTORY

MANAGEMENT AND MAINTENANCE

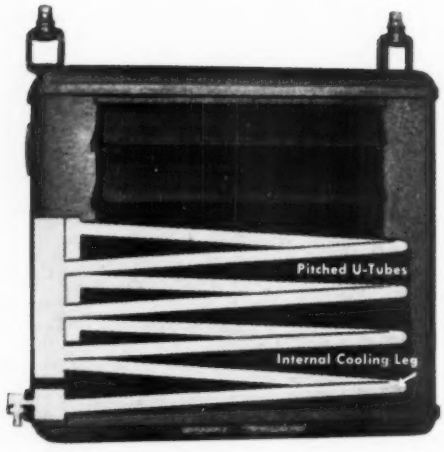
MAY 1953
IN TWO PARTS
PART ONE



LOWER-COST PRODUCTION

for today's...
and tomorrow's...
needs

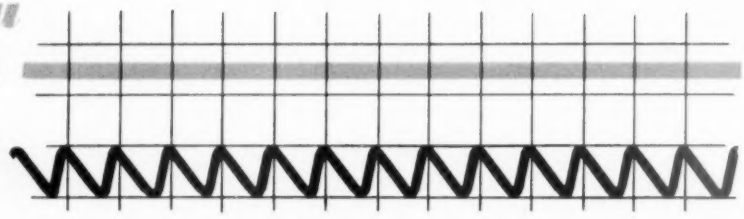
Special Report, Page 52



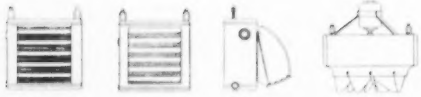
when buying unit heaters

be sure you get this

...not this!



With **THERMOLIER**...
the Grinnell Unit Heater . . . you get
CONTINUOUS RATED CAPACITY



THERMOLIER FEATURES

INTERNAL COOLING LEG A Grinnell feature which permits the use of a plain thermostatic trap for draining condensate.

PITCHED U-TUBES Built-in pitch of U-tubes provides complete drainage of condensate and elimination of destructive water hammer.

CONTINUOUS RATED CAPACITY The combination of Thermolier's internal cooling leg and the built-in pitch of tubes assures continuous rated capacity.

BUILT-IN EXPANSION PROVISIONS Every tube is an expansion bend of the U type to allow for independent expansion and contraction of each tube.

TUBE-TO-HEADER CONSTRUCTION Safety and durability assured by unique tube-to-header construction.

EASE OF ERECTION Exclusive with Thermolier are the adjustable swivel couplings which provide an easy, cost-saving method of hanging the unit.

SIMPLE PIPE CONNECTIONS The supply and return piping connections are on the same side to assure compactness, neatness and economy in installation.

MOTORS Thermolier motors are built specifically for unit heater duty. They give maximum operating efficiency with minimum power cost.

The practical advantages of unit heating, of course, are well known. But in order to get *maximum* economy and efficiency, certain engineering and structural features *must be* present in the unit heater of your choice.

Take provisions for draining off condensate. Failure to provide freedom from collected condensate in the heating element can interfere with heat output and adversely affect capacity.

A Thermolier Unit Heater successfully handles this drainage problem with its pitched U-tubes and internal cooling leg, through which all the condensate passes. In fact, condensate cooling is so efficient with Grinnell Thermoliers that a thermostatic trap — the simplest and least expensive of all traps — can be used with every model. Condensate temperature is lowered to the point where the trap is always draining — giving Thermolier Unit Heaters their *continuous rated capacity*.

Check Thermolier's advantages at left. For more details, call your local Grinnell distributor — or send for catalog.

GRINNELL

THERMOLIER UNIT HEATERS

Grinnell Company, Inc., Providence, Rhode Island • **Coast-to-Coast Network of Branch Warehouses and Distributors**

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Boxes scale a wall on rubber

A typical example of B. F. Goodrich improvement in rubber

LARGE cartons, small boxes, heavy bags climb this steep incline easily, quickly, without a slip. Almost every imaginable kind of package has to be carried up, and up again, for storage, shipment or manufacturing. It used to cost a lot of money.

Then B. F. Goodrich made a "climbing belt", one without buckets or cleats, that could grip boxes or other smooth articles and carry them uphill. But the boxes would slide down when the incline was too steep.

Again B. F. Goodrich engineers went to work on the problem and developed the entirely new Griptop belt you see here. In place of rough, dirt-catching knobs, they used parallel ribs that are cross cut into thousands of flexible rubber blocks—more than 5000 to the square foot. The tiny, self-cleaning grip blocks are tough enough to stand years of use, yet soft so they bend just enough to grip or seize anything carried by the belt, and move it safely, surely.

With the new Griptop belt, you can carry things at angles never possible before, and so save space, time and expensive handling. Now inclines as steep as 55° can be used, depending of course on the size and weight of the material.

The new Griptop belt design is one more example of the product improvement that's always going on at B. F. Goodrich. Every product B. F. Goodrich makes is constantly being studied by practical engineers with long field experience, to see how it can be improved from the user's standpoint, how it can be made to last longer and how it can be made to do a better job. To take full advantage of these many and frequent improvements, call your BFG distributor or write *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

FACTORY
MANAGEMENT AND MAINTENANCE

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Part Two is bound separately.
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THE MAGAZINE
OF PLANT MANAGEMENT
FOR 62 YEARS

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

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OSBORN

BEFORE: Closeup of helical gear before deburring.

Gone . . . costly thorns in their side

Burr removal by muscle methods is aggravating because it is costly, inefficient and non-uniform in quality. Here's how a truck manufacturer has banished these "thorns in the side" with push-button brushing.

The operation: to deburr, break and blend the flank edges of gear teeth prior to shaving and heat treating. Formerly done with a hand tool, in several operations, the work was tedious and required close inspection and reworking to meet rigid specifications.

Now, an Osborn Brushing Machine in one speedy operation smooths the entire tooth edge . . . produces *uniform blending* of surface junctures of *every tooth*. Result: lower costs and greater precision for *better performance* of the product in service.

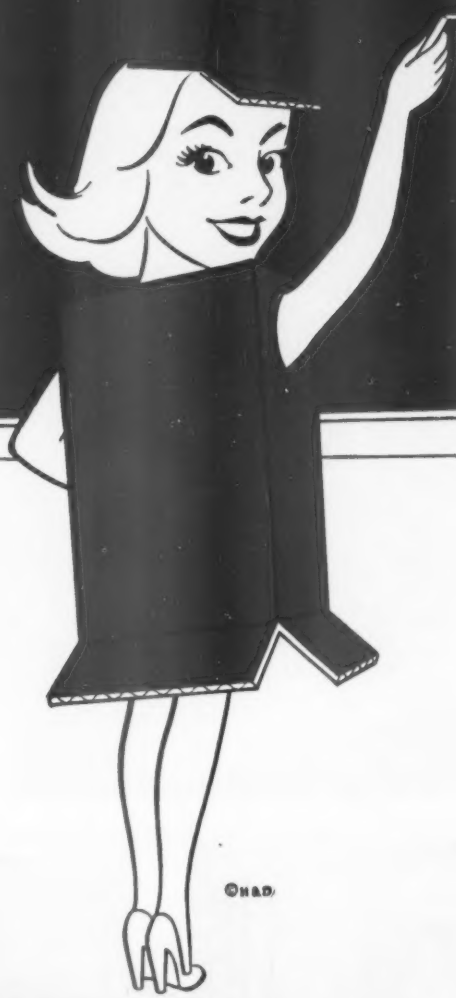
Find out how *you* can cut your costs and improve *your* products with power brushing. Call the nearby **O**sborn **B**rushing **A**nalyst or write *The Osborn Manufacturing Company, Dept. H-5, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

AFTER deburring with Osborn Brushing Machine.

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

Cora Gated



WHO AM I?

I'm Cora Gated . . .
H & D's new trade character.
Look for me and my signature
on the corrugated shipping
boxes you buy.
They are your guarantee
of the highest standard of
protection for your products.
Write for booklet,
"How To Pack It."
Hinde & Dauch,
Sandusky, Ohio.

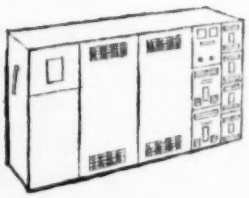
H&D®

Our 65th Year

HINDE & DAUCH

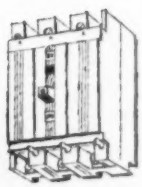
37 MILLS AND FACTORIES • 40 SALES OFFICES

AUTOMATION STARTS WITH WESTINGHOUSE EQUIPMENT



POWER CENTERS—How do Westinghouse Power Centers release space for production? See information in Westinghouse Power Centers ad on pages B-264, B-265

CONTROL CENTERS—Why do most control center buyers ask for Westinghouse? The control center ad will tell you why. It's on pages B-258, B-259



BREAKERS—How did Westinghouse Circuit Breakers cut down-time 98% on normal overload interruptions? Read the ad on pages B-262, B-263

Will your plant keep pace with industrial automation during the next ten years?

The plants that do will be better equipped to weather the tide of rising costs and the return to a competitive market. It will take shrewd planning and heads-up engineering. It will be a time when complete co-operation from your equipment suppliers will be most important.

You'll want the kind of application assistance that Westinghouse offers. Make use of the application know-how of your Westinghouse representative. Call on the Westinghouse product specialists to solve unusual product application problems. Ask for the service of a Westinghouse consulting and application engineer for those large "system" installations.

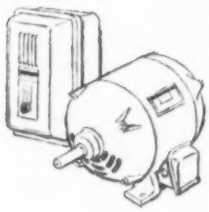
You'll want to take advantage of these other Westinghouse facilities, too: manufacturing capacity to produce what you want when you want it—research and engineering capacity to produce *modern* equipment—nationwide maintenance and repair capacity operated at the local level to assure service that is fast and complete.

Keep pace with automation. Call on Westinghouse for help. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-94960-A

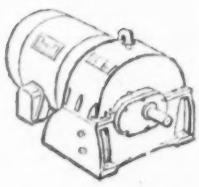
YOU CAN BE SURE...IF IT'S

Westinghouse

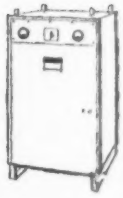


MOTORS AND CONTROLS—What Life-Line* really delivers is more service with less servicing. Read the Westinghouse ad on pages 44, 45

*T.M.



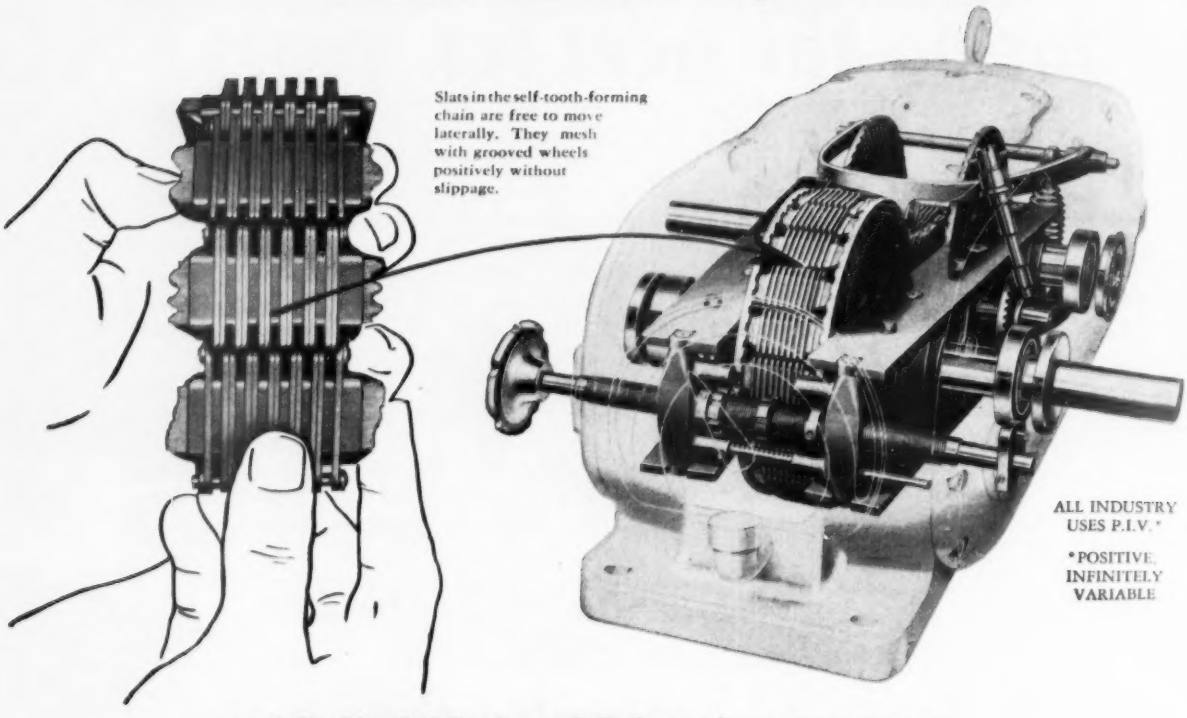
GEARED DRIVES—What advantages can you gain by specifying a complete drive team? The answers are in the Westinghouse ad on pages 34, 35



TRUCK CHARGERS—How has automatic battery charging been simplified and speeded? Check the Westinghouse Truck Charger ad on page B-383

LIGHTING—10% wattage increase produced three times as much light. Investigate the details in the Westinghouse Lighting ad on pages B-140, B-141

Completely POSITIVE...
Completely STEPLESS
with an infinite number of speed changes



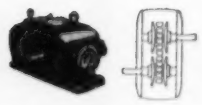
Slats in the self-tooth-forming chain are free to move laterally. They mesh with grooved wheels positively without slippage.

ALL INDUSTRY USES P.I.V.*

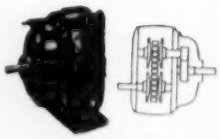
*POSITIVE, INFINITELY VARIABLE

P.I.V. Variable Speed Drive gives you exact selection from maximum to minimum speed

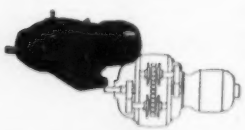
4 of 16 P.I.V types, ½ to 25 hp.—ratios to 6:1
Horizontal or Vertical Mountings



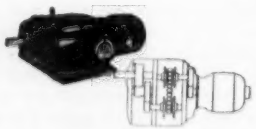
Basic Positive, Infinitely Variable Speed Drive. Compact.



P.I.V. with single reduction input or output helical gears.



Motorized P.I.V. with single reduction input and output helical gears.



Motorized P.I.V. with single reduction input and double reduction output helical gears.

ONLY Link-Belt's P.I.V. Variable Speed Drive uses self-tooth-forming chain to provide positive, stepless speed changing. The chain meshes with grooved wheels, transmits power without wasteful slip.

What's more, Link-Belt's P.I.V. changes speeds accurately under full load, delivers full-rated horsepower to your machines. That's because P.I.V. is not dependent on friction for power transmission. Its all-metal construction is not affected by atmospheric conditions.

Adjustment is easy. You can obtain an infinite number of speeds with manual, electric, pneumatic or hydraulic controls . . . hold the exact speed you need at any setting.

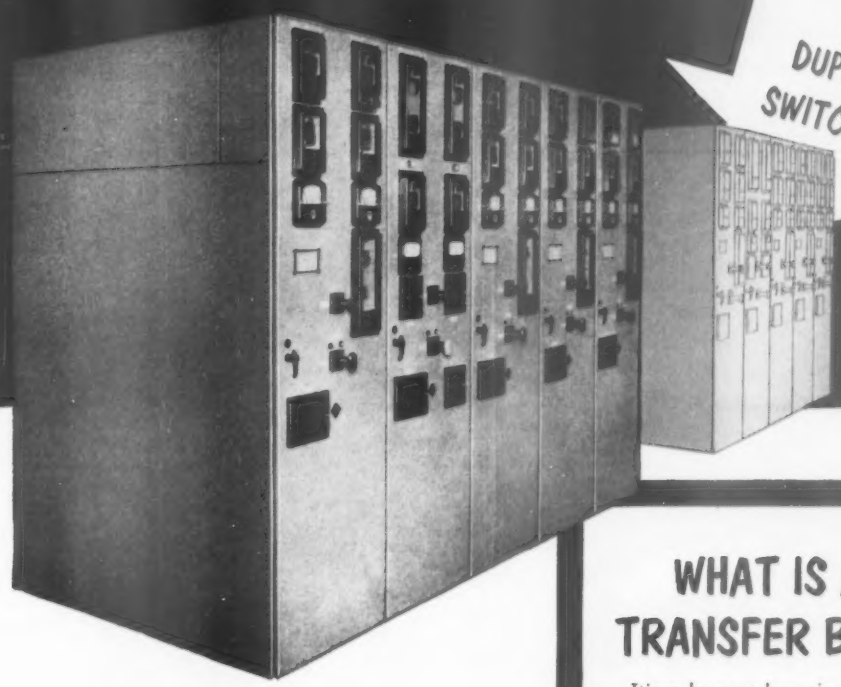
There may be a process in your plant that requires exact, variable speed transmission. If so, it will pay you to contact your nearest Link-Belt office. They'll show you how P.I.V. can increase the flexibility and efficiency of your machines. Send for Catalog No. 2274.

LINK-BELT
P.I.V. VARIABLE SPEED DRIVE

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,116

Switchgear ..With Transfer Bus Assures Power Continuity

WITHOUT THIS DUPLICATE SWITCHGEAR



WHAT IS A TRANSFER BUS?

It's a by-pass bus circuit that parallels the main switchgear bus . . . with means provided for switching loads to the transfer bus. Also makes it possible to withdraw and maintain circuit breakers, or inspect main bus without power outage. This method proved by utilities in hundreds of installations.

Saves 1/3 the Cost

You pay only for the addition of the transfer bus . . . not a complete set of duplicate switchgear with all of its expensive components. At least one-third is saved on entire installation.

Saves 1/2 the Space

Allis-Chalmers supplies transfer bus in same cubicle as switchgear, without adding cubicles . . . thus cutting floor space one-half.

Ask an Allis-Chalmers engineer about transfer bus arrangements and what they can mean to your plant in savings and service. And learn too about the unusual features that make it so easy to install A-C switchgear. Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3773

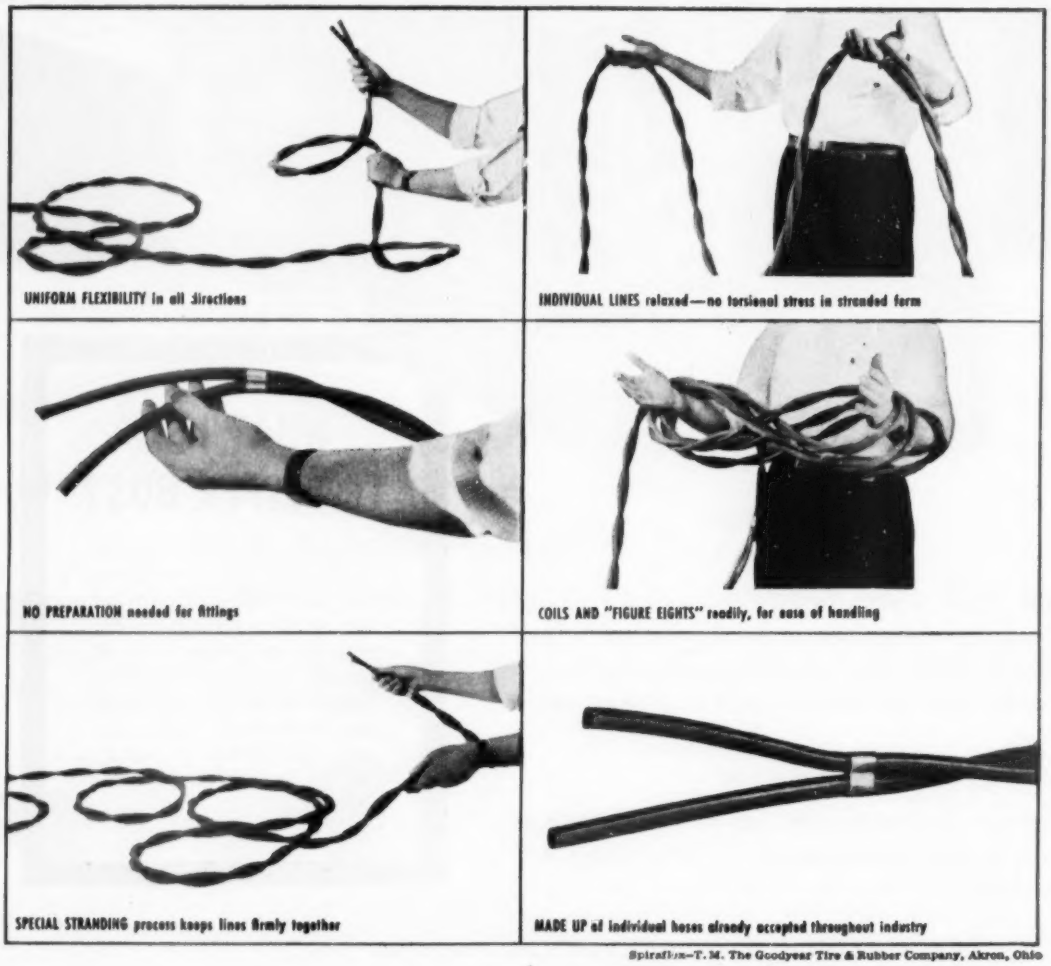
ALLIS-CHALMERS

Look at the advantages with NEW
SPIRAFLEX WELDING HOSE

WELDERS everywhere are welcoming Goodyear's new Spiraflex welding hose, because it gives them an ideal combination of working advantages no other hose can offer.

Spiraflex hose is *uniformly* flexible in all directions —making for ease of handling. It needs no special preparation for fittings—is lighter than other hose with same welding pressure, because Spiraflex is reinforced with rayon for high strength and light weight.

Ask your distributor about Spiraflex Welding Hose — in stock in 3/16", 1/4" and 5/16" sizes, and available in other sizes and combinations. Or write Goodyear, Mechanical Goods Div., Akron 16, Ohio.



UNIFORM FLEXIBILITY in all directions

INDIVIDUAL LINES relaxed—no torsional stress in stranded form

NO PREPARATION needed for fittings

COILS AND "FIGURE EIGHTS" readily, for ease of handling

SPECIAL STRANDING process keeps lines firmly together

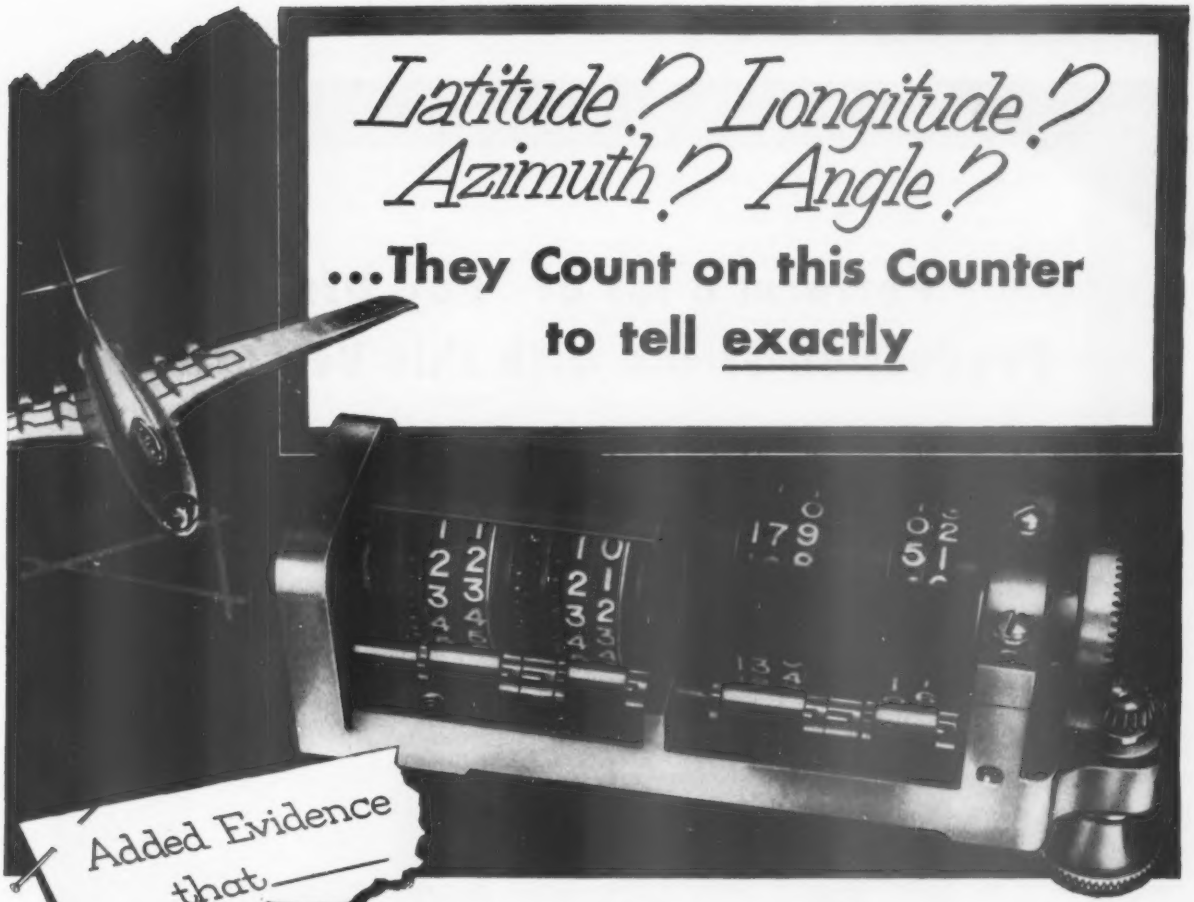
MADE UP of individual hoses already accepted throughout industry

Spiraflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network



Added Evidence that—

Everyone Can Count on VEEDER-ROOT

Aerial navigators and bombardiers rely on the figures that keep turning up on this Veeder-Root Counter, specially designed for the Armed Forces. And if *you* need to know exactly where you are, with any product or mechanism that's vital to Defense, then you can count on Veeder-Root to help you, to the utmost limits of ability . . . and of available capacity. Write:

VEEDER-ROOT INCORPORATED
"The Name That Counts"
HARTFORD 2, CONN.

Chicago 6, Ill. • New York 19 • Greenville, S. C.
Montreal 2, Canada • Dundee, Scotland

Offices and agents in principal cities

"Counts Everything on Earth"

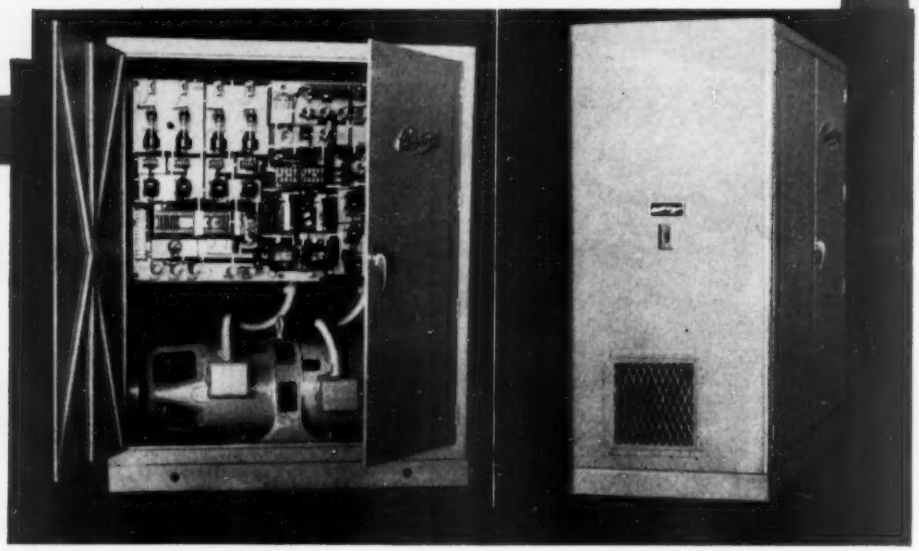
Perform a lot of "*Pay Off*" Production Tricks with this Versatile

Century

Selective Speed Drive

POWER UNIT — Inside front view showing control and motor generator set.

Side view of power unit showing air cleaner for forced air ventilation.



Century Motors and Generators
A.C.-D.C.—⅛ to 400 H.P.

CENTURY ELECTRIC
1806 PINE STREET ♦ ST. LOUIS 3, MISSOURI

●You can instantly dial the OPTIMUM carbide tool cutting speed for any diameter of work or class of material.

●For repetitive production, you can automatically control the correct OPTIMUM pre-set cutting speeds for two or more diameters.

●Also for repetitive production you can automatically control the OPTIMUM carbide tool cutting speeds for all the varying diameters of a facing operation.

●You can perform a continuous, closely controlled process on flat or round material:

1. With a wide range of speed adjustments to suit various material sizes and processes.
2. You can feed the material through the process with a pre-selected automatically controlled constant speed, while the material is unwound and rewound on the continuously varying diameters of the spools which hold the processed material.

● You can accurately control assembly line conveyors over a wide range of speeds, and precisely coordinate the speed and timing of feed conveyors.

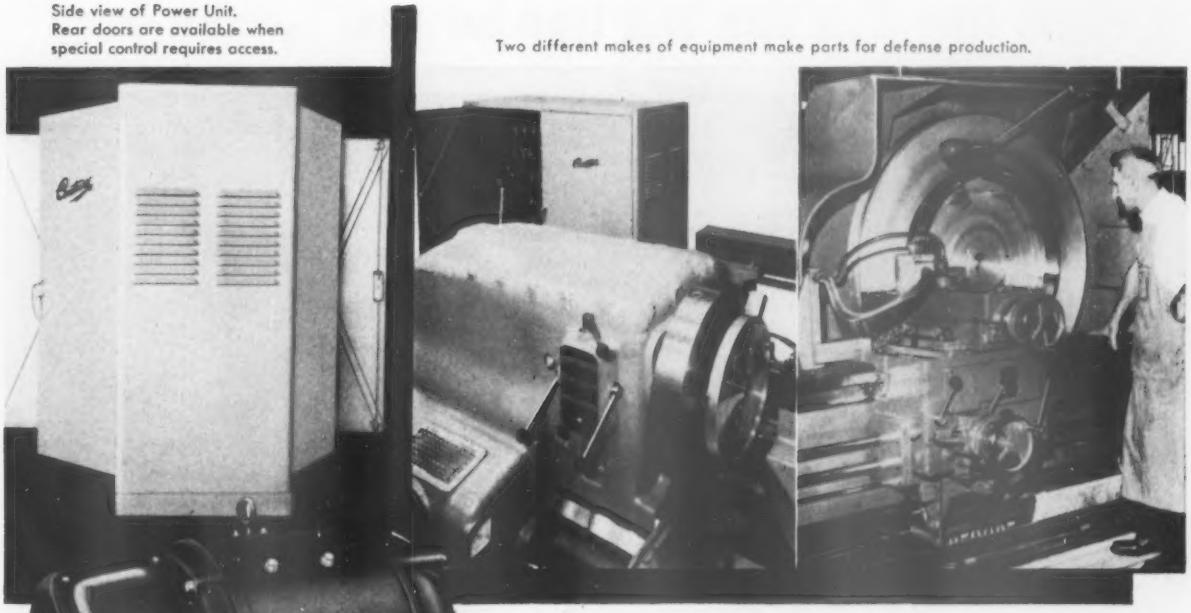
● You can: (1) inch the load . . . (2) accelerate the load fast or slow . . . (3) stop the load quick or slow . . . (4) stop and start at a controlled pre-set speed . . . (5) reverse the load under specific conditions . . . and (7) you can use a multiple of co-ordinated drives for related functions.

● Because of the minute amount of control current required for handling large horsepower, many forms and shapes of control devices are available with this most versatile Century Selective Speed Drive. These pilot controls can often be mechanically interlocked in the driven machine to direct specific functions.

A Century motor specialist will be glad to discuss with you the specific benefits you can get from Century Selective Speed Drives. They may be adapted to your present — or new — production equipment.

Side view of Power Unit. Rear doors are available when special control requires access.

Two different makes of equipment make parts for defense production.



Typical drive motor which operates from the alternating current power unit.

The OPTIMUM cutting speeds are automatically controlled to provide a uniform cutting speed for all the varying diameters of the facing operation.

Write . . . ask that a Century application engineer consult with you.

C O M P A N Y

Century C MOTORS

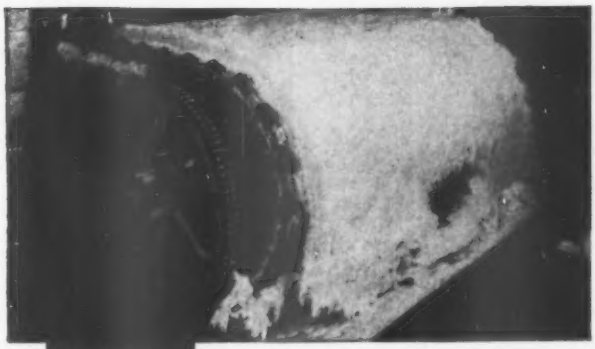
Offices and Stock Points in Principal Cities

CE-756

What is the right chain for your drive or conveying job?

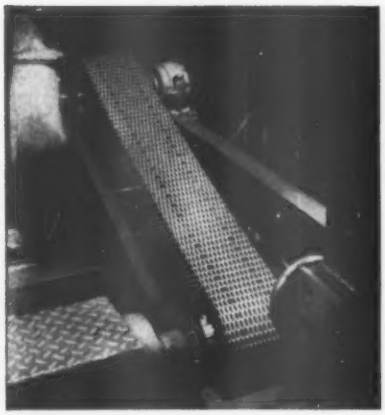
You'll find the answer in LINK-BELT's complete chain line... a size and type for your specific job

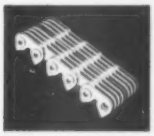
COAL LOADER handles large tonnages underground. To convey the coal Link-Belt Precision Steel Roller Chain, fitted with special attachments, is used. Selected because of its extra strength, it assures long life under the wet, abrasive conditions prevalent in most mining operations.



CHEMICAL and allied industries are served by Link-Belt drive and conveyor chains and sprockets. Class SS roller-type chain and Precision Steel Roller Chain appear on this mineral wool conveyor.

AGRICULTURAL MACHINES use Link-Belt chain for both drive and conveying service. On this combine, single and multiple-width Link-Belt Precision Steel Roller Chain drives were chosen.





PRINTING PRESS manufacturers utilize Link-Belt Silent Chain drives on the majority of the company's high-speed, high production presses to insure accurate register.

INDUSTRIAL TRUCKS, such as this high-lift model, call for the built-in dependability of Link-Belt Precision Steel Roller Chain.

METAL WORKING plants rely on Link-Belt chain for many tough jobs. Here Class C combination chains with outside rollers feed brass bars into cold-rolling mill.

FOLLOW THE LEAD OF ALL INDUSTRY — FOR YOUR COMPLETE DRIVE AND CONVEYING CHAIN NEEDS RELY ON...

LINK-BELT

CHAINS AND SPROCKETS

13,148

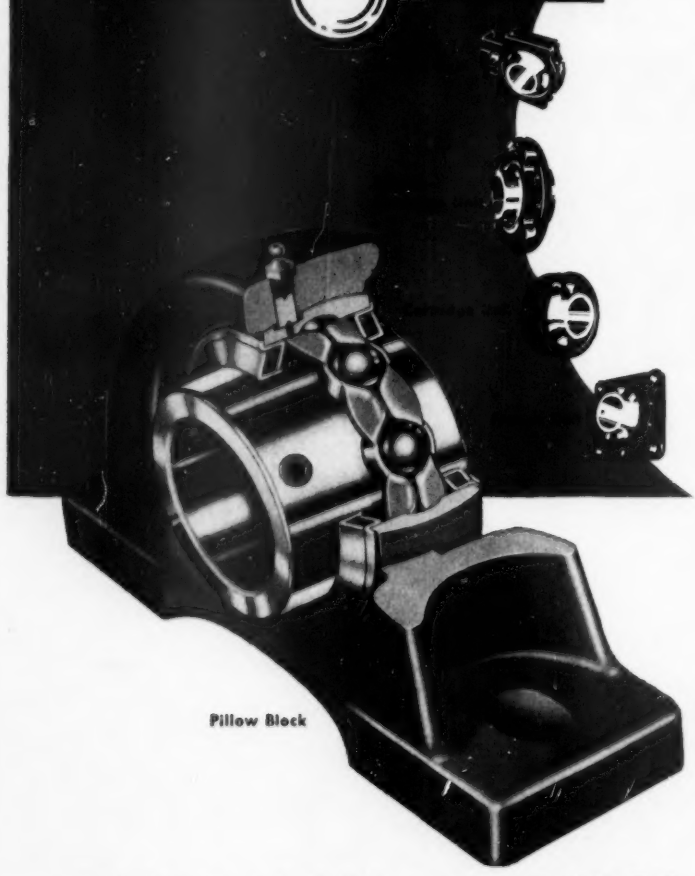
LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities.

YOUR LOGICAL CHOICE

Wherever Bearing Performance and Cost are Important

SEALMASTER

BALL BEARING UNITS



Pillow Block

For ALL These Reasons

1. **PERMANENTLY SEALED**
   to exclude dirt and retain proper amount of lubricant.
2. **SELF-ALIGNING**
   in any direction without seal distortion.
3. **PRE-LUBRICATED**
   with the proper amount of lubricant—for long service.
4. **ZONE HARDENING**
   of ball path section of inner race ring, with extended part of race left soft for better race-to-shaft locking.
5. **NO HOUSING WEAR**
   —patented locking pin and dimple prevent rotation of outer race in housing.
6. **FLOATING BALL RETAINER**
   traps lubricant, prevents churning.

To the thoughtful engineer or operating executive, *each* of these SEALMASTER features is a convincing reason for choosing SEALMASTER Ball Bearing Units. *Together*, this exclusive combination of basic advantages offers sound assurance of top performance *under all conditions*. Write now for your copy of Catalog 845—complete data on the broad SEALMASTER line.

SEALMASTER BEARINGS

A DIVISION OF STEPHENS-ADAMSON MFG. COMPANY • 1 RIDGEWAY AVENUE, AURORA, ILLINOIS

FACTORY REPRESENTATIVES AND DEALERS IN ALL PRINCIPAL CITIES

Corrosion won't hurt this TRI-CLAD motor's cast-iron frame

REG. U.S. PAT. OFF.

HERE'S A COMMON SIGHT AROUND MANY PLANTS—A G-E Tri-Clad motor operating reliably and continuously under the extremely corrosive conditions that cause many other motors to fail.

THAT'S WHY YOU CAN EXPECT superior performance from G-E Tri-Clad motors. Consider these facts:

CORROSION-RESISTANT CAST-IRON means longer motor life. Unlike steel, cast-iron resists corrosive pitting, even when the paint is chipped.

RIGID, CAST STATOR FRAME with integrally cast feet, can't be twisted out of line by accidental jarring or by excessive "bolt-down" pressure on the feet.

STRONG, CAST-IRON END SHIELDS have cast ribs for extra strength without adding extra weight . . . protect the true motor alignment even under heavy shaft loads.

ORDER G-E TRI-CLAD MOTORS from your nearby G-E Apparatus Sales Office or G-E Agent or distributor. General Electric Co., Schenectady 5, N. Y. 752-19

You can put your confidence in

GENERAL ELECTRIC

"A Triple play BY RB&W REALLY SAVED US PLENTY!"

"It took us by surprise," Al went on, "when an RB&W man told us* he could speed up assembly of this precision screw-and-clamp unit and save us money besides. We figured we'd been doing O.K. the old way."

"What was the old way?" asked Mac, who'd recently started in at the shop.

"Well, it was a one-two-three operation. We used to machine the slotted-head screw for the clamp on that machine over there. Then we'd make a special collar, and fit it around the screw head to prevent the screw-driver from slipping out of the slot while the clamp was being applied or adjusted.

"What RB&W did was to cold-form the whole thing—screw, slot and collar—all in one piece. Wasn't an easy job, either—they had to strike a slot in the screw head and form the collar at the same time. Now we're saving one-third on our previous assembly costs—along with the price of the special collar."

Which proves that you can generally cut costs, if you look hard enough . . . even in such simple things as fasteners. It also underlines the creative approach to fastening problems you can expect from RB&W, as well as practical experience in designing and fabricating. If the fastener you need can't be supplied from our extensive stock, we'll study your assembly operation and make the right one for the job.

Remember—for any fastening operation, it's a smart move to call in RB&W. You can count on RB&W bolts, nuts, screws and rivets for uniform accuracy, dependability and physical properties. And you can also count on fast service from RB&W's strategically located plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Pittsburgh, Detroit, Chicago, Dallas, San Francisco. Sales agents at: Portland, Seattle. Distributors from coast to coast.

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

2.12

*George K. Garrett Co., Philadelphia, Pa.

BUILDING - THROUGH BUSINESS - FOR A BETTER AMERICA! support Junior Achievement

RB&W 108 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Who's wasting what? where?

Here's a competent and diligent worker doing what's needed to keep an important pipe line operating. How could that be a waste of high-priced maintenance time?

Maybe the waste was in buying valves and fittings that don't last. And in overlooking the fact that resulting upkeep, at today's maintenance rates especially, can quickly cancel out price tag "savings."

Waste of that kind can be avoided by thrifty buying. By insisting on better quality in piping equipment.

That's why buyers in so many plants today are looking for products that insure longer life, fewer repairs, less trouble in the line. And there's where Crane Quality shows up best. It's the dependable choice of thrifty buyers in every industry.

Crane Co., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas.

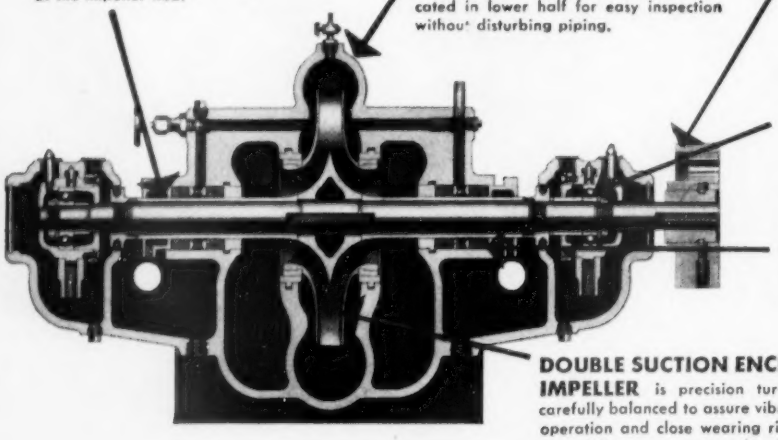
CRANE

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Look for These 7 Signs of GOOD PUMP DESIGN

CAST SHAFT SLEEVES, not commercial tubing, save the shaft from wear. Sleeves extend through the stuffing box and seal at the impeller hub.

HEAVY HORIZONTAL SPLIT CAST-IRON CASING construction with suction and discharge nozzles located in lower half for easy inspection without disturbing piping.

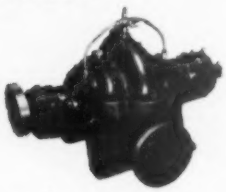


COUPLINGS have *Magic-Grip* quick change bushings for pump and drive shaft. Pin and rubber bushing type usually used. Removal for maintenance is easy.

BALL BEARINGS may be furnished for either oil or grease lubrication. Sleeve bearings also available in larger sizes.

GENEROUS STUFFING BOX LENGTH contains sufficient packing to keep stuffing box maintenance low. Provision is made for sealing water connections or for grease seal if these are required.

DOUBLE SUCTION ENCLOSED IMPELLER is precision turned and carefully balanced to assure vibrationless operation and close wearing ring clearance. Water passages are hand finished to a smooth surface.



STANDARD AND SPECIAL MATERIALS are available for many types of service where government regulations permit. Iron, bronze, stainless steel and combinations of these materials handle both alkaline and acid solutions. Standard sizes carried in stock range from 10 to 7000 gpm with heads as high as 475 feet.

THESE DESIGN AND CONSTRUCTION features of Allis-Chalmers double suction pumps assure long pump life and low maintenance costs. Every A-C double suction pump is carefully tested on the most modern pump testing equipment in the industry.

Complete Pumping Unit

Allis-Chalmers can furnish the complete pumping unit — pump, motor, control and drive — all of coordinated design and manufacture.

Whatever your pumping problem, call your nearby Allis-Chalmers Authorized Distributor or District Office. Or write for Bulletin 08B6146. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3952

Texrope, Magic-Grip, and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

ALLIS-CHALMERS

When thinking of the little bill don't forget

The BIG Bill!

This shouldn't happen . . . but it does. When planning a maintenance painting job, more time, more thought, more words are spent on the *cost* of the paint . . . *which is wrong*. On the average, paint represents only 20% of the total cost of the job. *Labor* represents 80%. And always, the quality of the paint you buy has a direct bearing on what you save or lose on labor.

Use Barreled Sunlight and you'll *save* more on labor. True, Barreled Sunlight's proved ability to take more thinner offsets the few extra pennies you might have to pay for the paint itself. But of even greater importance, Barreled Sunlight's ease of application . . . its faster flow, its greater coverage per stroke, its better hiding power, its extra "yardage" per gallon . . . all add up to savings, *big* savings in labor, *big* savings on the total cost.

We'll be glad to prove this by a simple "on-the-wall" test. Write and our representative nearest you will gladly explain in detail.

BARRELED SUNLIGHT PAINT COMPANY
2-E Dudley St., Providence, R. I.

Barreled Sunlight®
Paints

In whitest white or clean, clear, wanted colors, there's a Barreled Sunlight Paint for every job

IT ALWAYS COSTS MORE NOT TO PAINT!

For over half a century those who know the best in paints . . . for all types of buildings . . . have strongly insisted on famous Barreled Sunlight

UDYLITE BRY-CAD

THE NEW BRIGHT CADMIUM PROCESS!

New Udylite Bry-Cad is unequalled in brightness, throwing power, plating speed and covering!

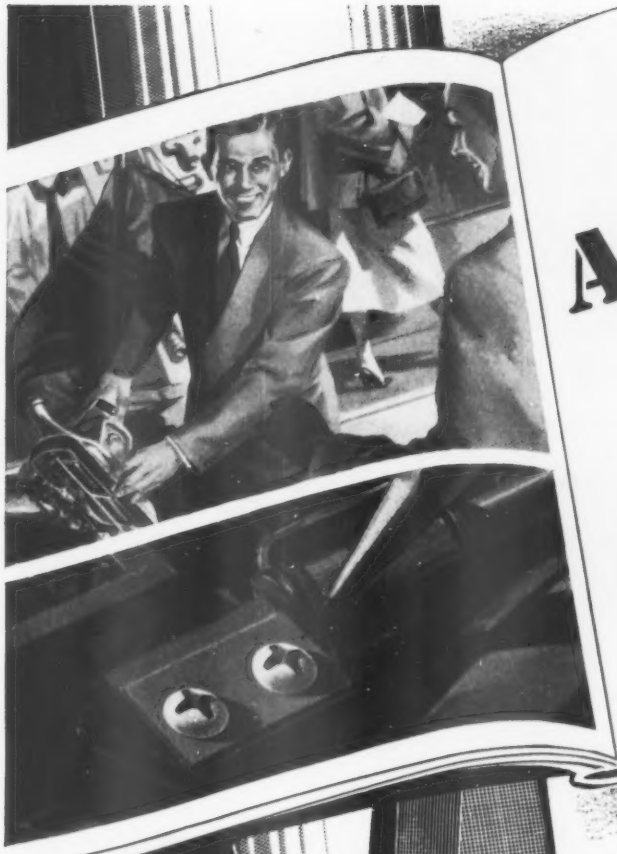
But that's not all! Bry-Cad offers exceptional operating economy, too. It is highly resistant to both organic and metallic impurities. New Udylite Bry-Cad provides high cathode efficiency and operates over a wide current density range with little "gassing" and no spray. This materially reduces waste.

Complicated parts . . . deep recessed . . . intricate shapes . . . are all plated uniformly with new Bry-Cad. And only one liquid brightener is needed for the whole operation.

Have your Udylite Technical Man give you the complete story or write direct. THE UDYLITE CORPORATION, DETROIT 11, MICHIGAN. *West of Rockies, L. A. Butcher Co., Los Angeles 23, California.*

PIONEER OF A BETTER WAY IN PLATING

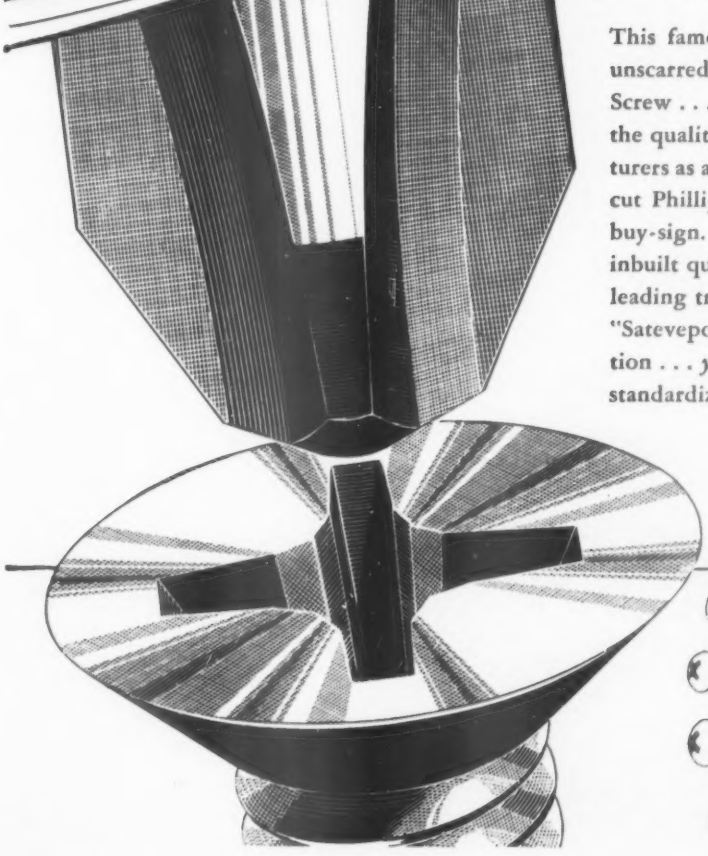
THE *Udylite* CORPORATION
DETROIT 11, MICHIGAN



THE AMERICAN STORY

CHAPTER EIGHT

The Clue that Clinches



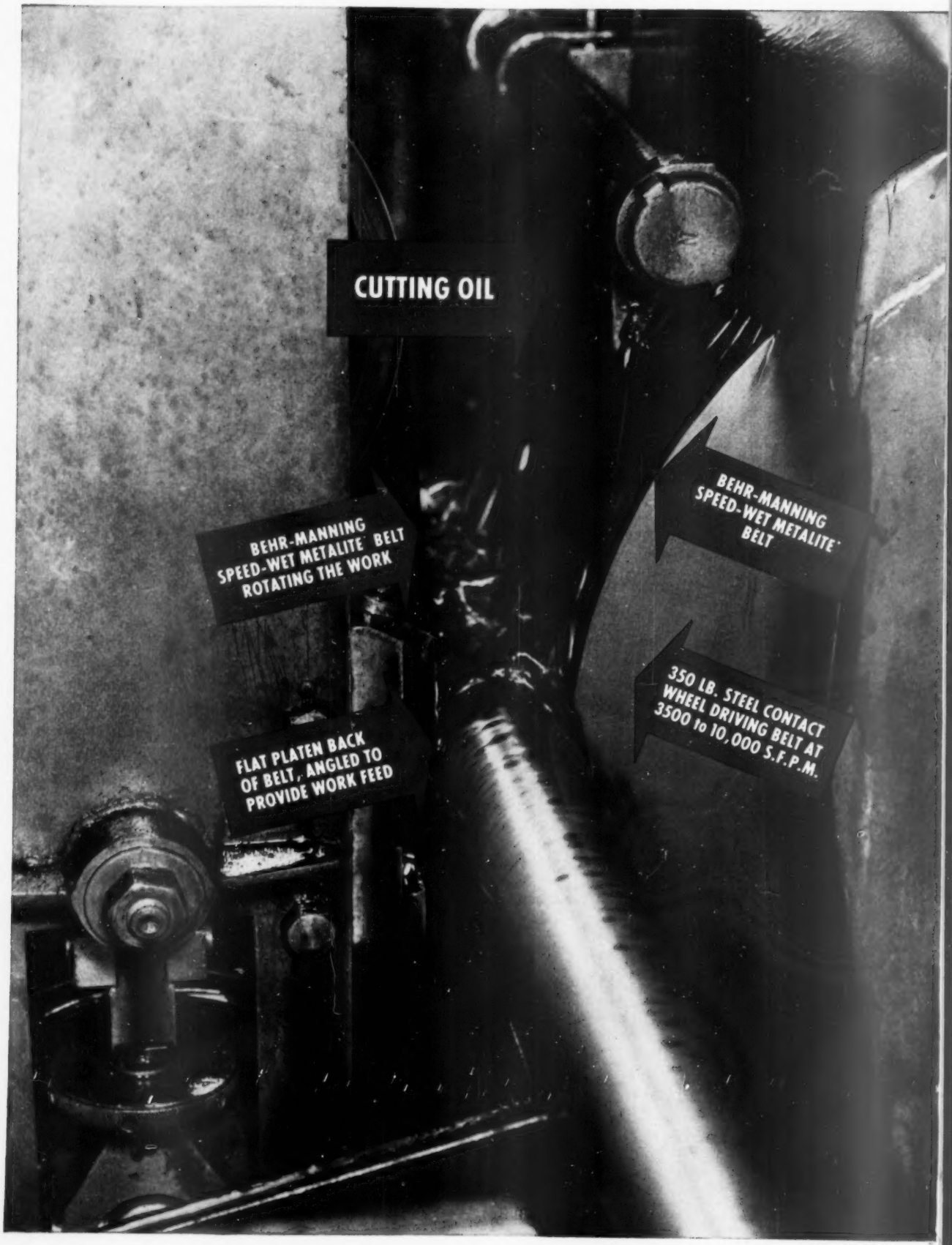
This famous *"Clue to Quality"* . . . the goodlooking, unscarred head of an American Phillips Recessed-Head Screw . . . is being searched for more, every day, by the quality buyer. Long accepted by leading manufacturers as a guardian *both* of costs and quality, the clean-cut Phillips Recess has also become a national retail buy-sign. It's a readily recognized outward mark of inbuilt quality, underscored by national advertising in leading trade and consumer magazines, including the "Satevepost". Yes, you not only step up your production . . . *you step up your sales as well* . . . when you standardize *all* assemblies on American Phillips Screws.

AMERICAN SCREW COMPANY

PHILLIPS HEADquarters

WILLIMANTIC, CONNECTICUT

Main Office & Plant
Willimantic, Connecticut
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.


CUTTING OIL
BEHR-MANNING SPEED-WET METALITE BELT ROTATING THE WORK
BEHR-MANNING SPEED-WET METALITE BELT
FLAT PLATEN BACK OF BELT, ANGLED TO PROVIDE WORK FEED
350 LB. STEEL CONTACT WHEEL DRIVING BELT AT 3500 to 10,000 S.F.P.M.

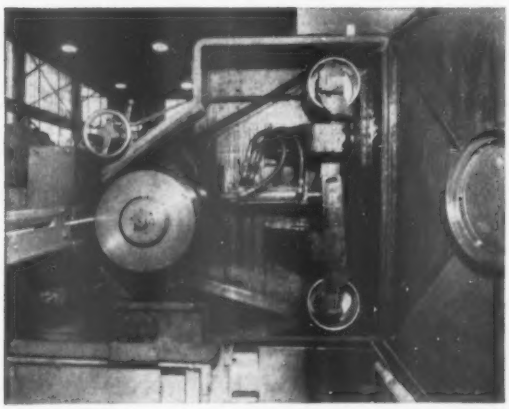
Talk about stock removal!

BEHR-MANNING SPEED-WET® METALITE® BELT REDUCES ROUND STOCK...

One pound per minute!

Here's precision grinding history in the making—a new centerless grinding machine which applies the great stock removal qualities of BEHR-MANNING METALITE Belts. The 9-in. wide grinding belt is lubricated with cutting oil, and runs over a 20-in. diameter steel contact wheel which weighs about 350 lbs. Surface speed of the belt is from 3500 to 10,000 f.p.m.

The workpiece is revolved and fed across the grinding belt by a SPEED-WET METALITE regulating belt operating over a flat steel platen. The regulator belt is 3/4-in. wider than the grinding belt, to start rotation of the work before it reaches the grinding belt. The work in this case was 15-ft. rounded stainless steel tubes. Tubes were weighed before and after grinding, disclosing the startling result of 1 lb. per minute in weight of stock removed.



GRINDING BELT AND CONTACT WHEEL HOUSING WITH COVER SWUNG BACK. NOTE HYDRAULIC BELT TENSION DEVICE.

It is significant that in the test run of twelve tubes, *the original belt removed as much stock during the last pass of the twelfth tube as at the first pass of the first tube.* The almost incredible production speed was obtained largely on (1) the ability of the resin anchoring of the abrasive grains to stand up to the work in spite of the very heavy pressure involved; (2) the hardness of the grains, maintaining their cutting edges undiminished after much work; and (3) the belt's cool-cutting qualities, further helped by the action of the cutting oil.

The process is applicable to any bar or tubular stock. The machine was built by Production Machine Co., Greenfield, Mass.

THIS WILL EXPEDITE YOUR WORK

If you want to find out, check with your nearby BEHR-MANNING Field Engineer about it—or about any other grinding or polishing problem you may have. For general information read "Blueprints for Production"—a review of new methods which may easily save you money. Write Behr-Manning Corp., Troy, N. Y., Dept. FM-5

For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

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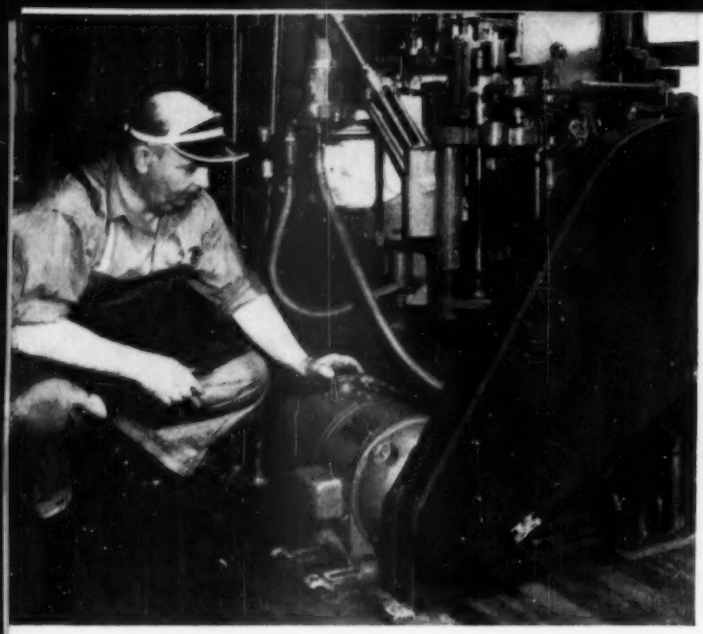
BEHR-MANNING ®

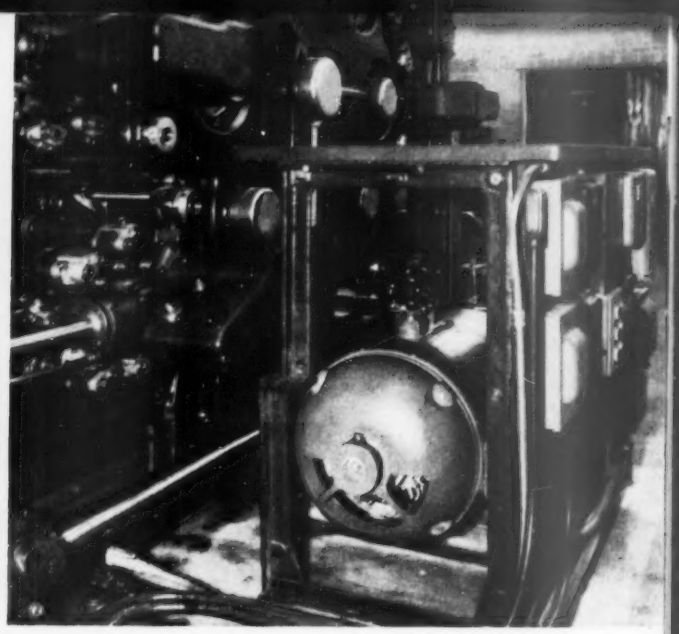
BEHR-MANNING

CORPORATION

division of NORTON Company

▲COATED ABRASIVES
▲SHARPENING STONES
▲PRESSURE-SENSITIVE TAPES

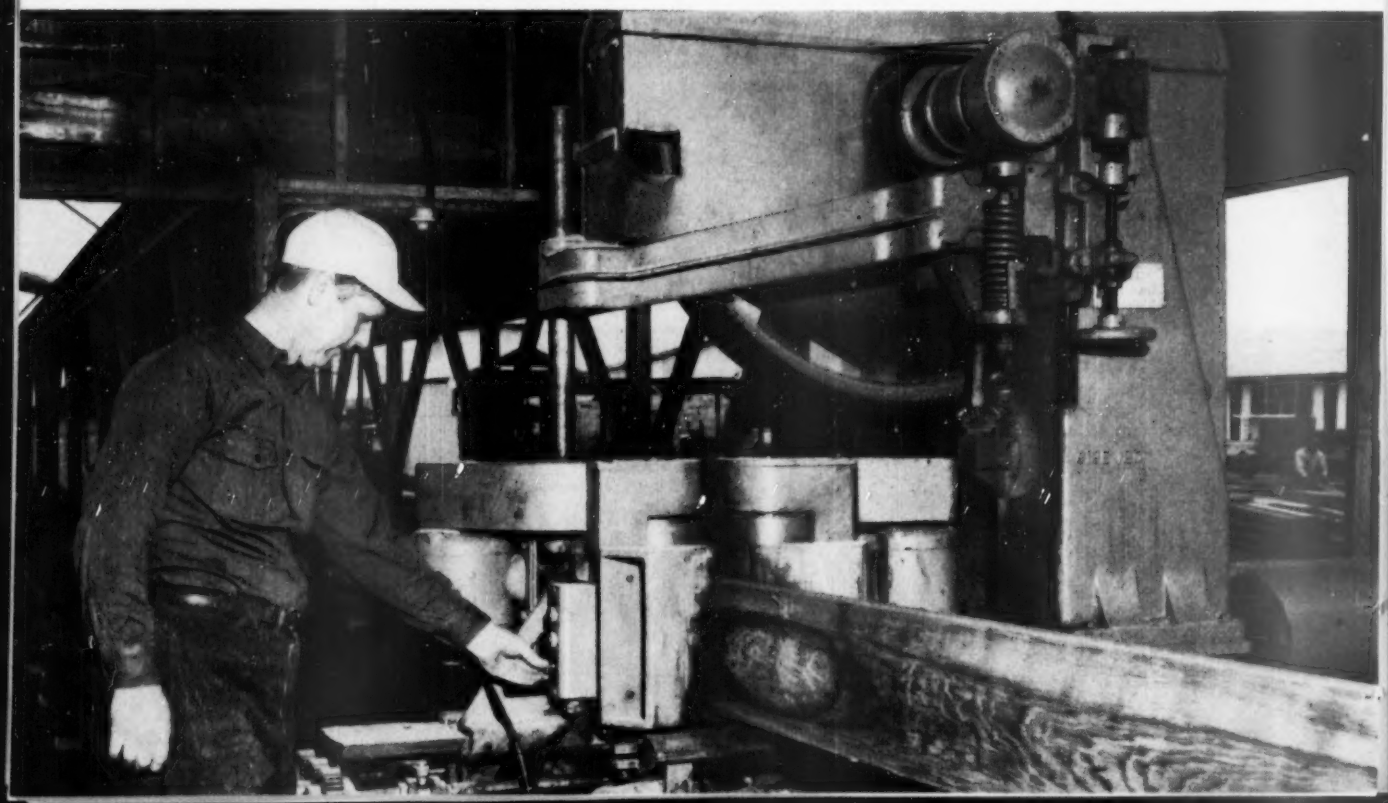




G-E ACA MOTOR as applied on a monotype casting machine in the plant of the Los Angeles Examiner (left) and as the main drive on a five color press in the plant of the Kansas Color Press, Lawrence, Kansas. The G-E ACA motor is your simplest and most economical electrical adjustable-speed drive. You get stepless speed adjustment directly from AC power over a 3 to 1, 6 to 1, and 20 to 1 range. No external conversion equipment is necessary. For additional information, check the coupon for Bulletin GEA-4883.

How a G-E Adjustable-speed Drive

G-E THY-MO-TROL® DRIVE at the San Jose Lumber Sales and Milling Company, San Jose, California, enables the operator to vary the speed of the resaw feed roll from 8 ft. to 250 ft. per minute. G-E Thy-mo-trol Drive can be made to hold speed regulation as close as ± ½%. It is available between 1/40 and 75 horsepower and offers smooth, stepless speed adjustment ranging up to 100 to 1. G-E Thy-mo-trol is easy to install, maintain, and operate. For complete information, check Bulletin GEA-5337 in the coupon at right.



TWO G-E SPEED VARIATORS, one of which drives the cutter-head and the other the bar-feed on this installation at the Allegheny-Ludlum Steel Co., Watervliet, N. Y. G-E Speed Variators are available in ratings from 1 to 200 hp, with excellent speed regulation and in speed ranges up to 40 to 1. With the addition of an amplidyne or electronic regulator, the Speed Variator will give you even closer speed regulation. The packaged power unit is easy to maintain, easy to move to new locations. Ask for Bul. GEA-5335 and 36.

can increase your production!

G-E ADJUSTABLE-SPEED DRIVES mean accurate, stepless motor speed control . . . the chance to improve the versatility of your present machinery . . . increase your production. With a G-E Adjustable-speed Drive you can reduce waste . . . improve product quality.

G-E ADJUSTABLE-SPEED DRIVE WILL ENABLE YOU to produce a greater variety of goods . . . for with the flexibility of adjustable motor speeds you can greatly diversify your product output. Fundamental speed adjustment is available from the G-E ACA motor which is controlled by a simple twist of the dial . . . precise speed control can be obtained with the G-E Thymo-trol drive or Speed Variator. Whatever your need, there is a General Electric Adjustable-speed Drive for you . . . packaged drives are available from 1/40 to 200 hp . . . speed ranges from 3 to 1 up to 100 to 1.

TO GET COMPLETE INFORMATION consult your nearest General Electric Apparatus Sales Office. Your G-E Sales Representative will be glad to recommend the most economical drive best suited for your operation. For printed information on the complete line of G-E Adjustable-speed Drives, use the coupon.

*Reg. Trademark of the General Electric Company.

You can put your confidence in—

GENERAL ELECTRIC

LET G.E. HELP YOU PICK THE RIGHT DRIVE

Because only General Electric makes all major types of electric adjustable-speed drives, it is best qualified to help you select the right drive. Send for these informative bulletins.

☐ **A.** This 26-page manual describes all four types of drives and where to apply them. Bulletin GEA-5334.

☐ **B.** Lower cost, simplest a-c drive. Bulletin GEA-4883.

☐ **C.** More flexibility, moderate cost. Bulletin GEA-5335.

☐ **D.** Top performance, 1/40 — 75 hp. Bulletin GEA-5337.

☐ **E.** Top performance, 1–200 hp. Bulletin GEA-5336.

General Electric Company
Section C 646-23
Schenectady 5, N. Y.

Please send me the bulletins checked
☐ for reference only
☐ for planning an immediate project

NAME .....
COMPANY .....
ADDRESS .....
CITY ..... STATE .....

—and now TAPER-LOCK

There's only ONE **TAPER-LOCK**

FROM the package to the shaft — ready, *immediately,* for the job! This is the new "off-the-shelf" availability which Dodge brings to roller chain drives. And, with this new availability, you get the important advantages of the famous Taper-Lock principle, proved in millions of V-belt installations.

No more costly and time-consuming boring of sprockets to fit your shafts! *Taper-Lock bushings are available in a range of sizes for the great majority of industrial applications.* And it's not necessary that shafts be turned and ground to get a tight fit. *Taper-Lock not only is keyed to the shaft, but grips it with the firmness of a shrunk-on fit.* Yet when a sprocket is to be replaced, it comes off easily, quickly. The bushing may be re-used.

Taper-Lock sprockets are compact. They have no flange, and no protruding parts. Taper-Lock occupies no more space on the shaft than standard sprockets. The flush design means safety.

The new Dodge line of roller chain is made to highest quality standards, by craftsmen who know chain manufacture. Both chain and sprockets are made to ASA standards. Taper-Lock sprockets will take any make of American standard chain.

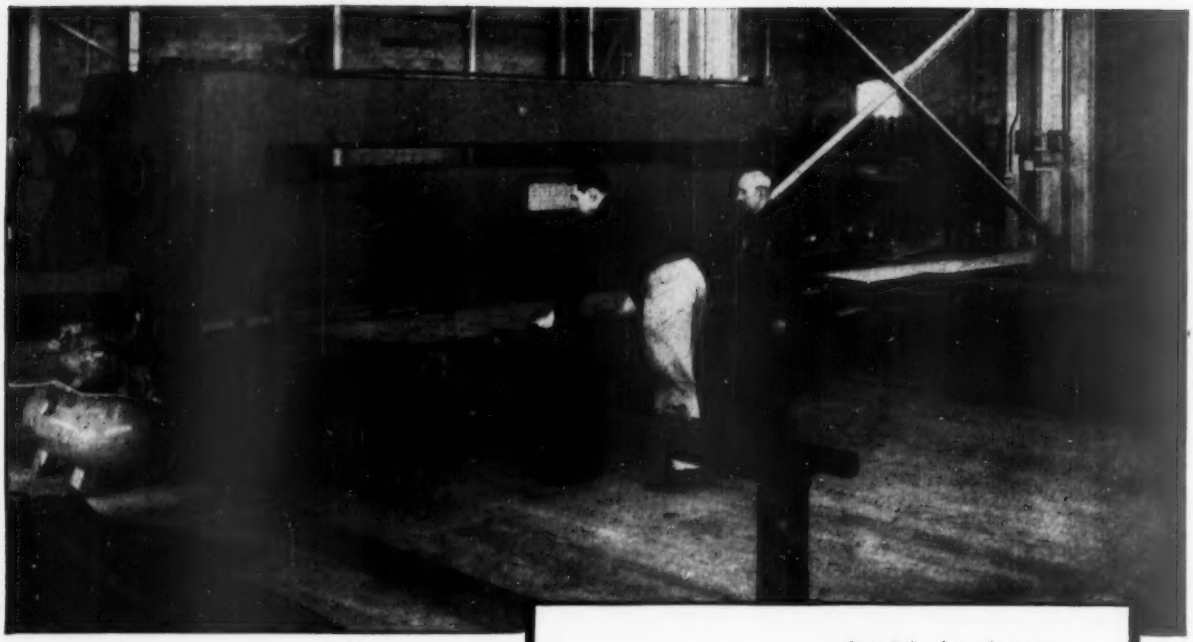
Taper-Lock sprockets will be carried in Distributors' stocks for immediate delivery, in a complete range of B-type steel sprockets—½″ to 1¼″ pitch. The range in ⅝″ pitch, for example, is 12 to 112 teeth.

All bushings and the smaller sizes of sprockets are packaged individually. Dodge roller chain is packaged in 10-foot lengths — and can be furnished in 50-foot and 100-foot reels.

For detailed information about Taper-Lock sprockets and Dodge chain drives write now for Bulletin A-624.

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Indiana

SPROCKETS
-and DODGE ROLLER CHAIN
DODGE 60
TAPER-LOCK BUSHING 2012
2012
DODGE
CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory-trained by Dodge, he can give you news of cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.



"NEVER SEEN A *SMOOTHER* OPERATING SHEAR"

Steel Warehouse Elated with Steelweld Shear

For 57 years The Enos & Sanderson Company, Buffalo, N. Y. has been supplying steel sheets and plates to hundreds of Niagara Frontier factories. Recently they installed a Steelweld Shear in their new warehouse. This is used for cutting various thicknesses to 1/4" x 12', as per customer orders. Cuts must be smooth, straight and accurate. Speed is essential to provide best service possible.

Enos & Sanderson's new 35,000 sq. ft. steel warehouse

The following paragraph in an unsolicited letter from Enos & Sanderson indicates how well their Steelweld Shear is serving their needs:

"We are extremely satisfied with the operation of this unit and would recommend this machine highly to anyone. A rigger, who set up this shear for operation, remarked that, in his twenty-five years of work with shears of all types, he had never seen a smoother operating shear in his experience."

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

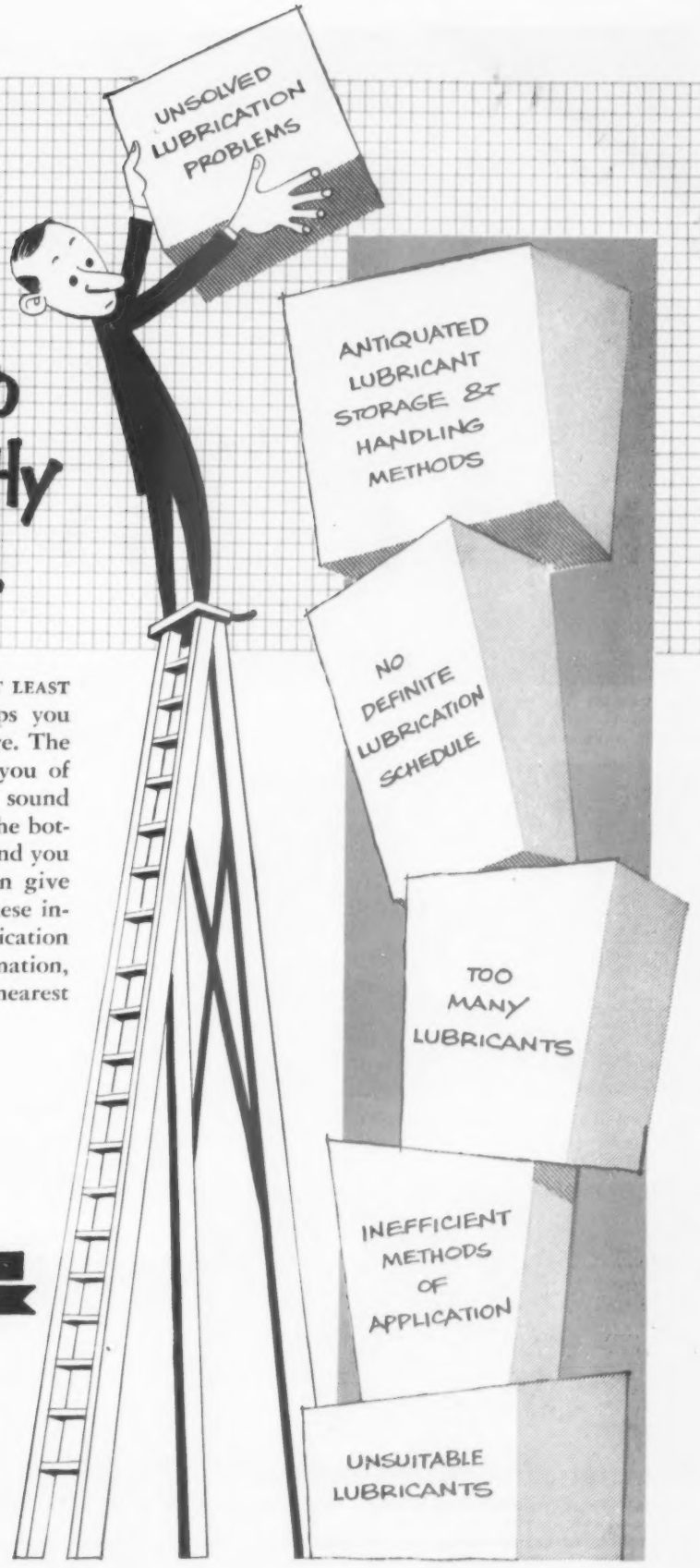
THE CLEVELAND CRANE & ENGINEERING CO.

3235 EAST 282nd ST. WICKLIFFE, OHIO.

STEELWELD PIVOTED BLADE SHEARS

Series No. 4B12 Steelweld Shear. With more than a half century of experience in steel warehousing, Enos & Sanderson know what good shearing is. They are proud of this machine. They advertise that: "Trained shearing teams will give you the finest edge ever cut with this Steelweld".

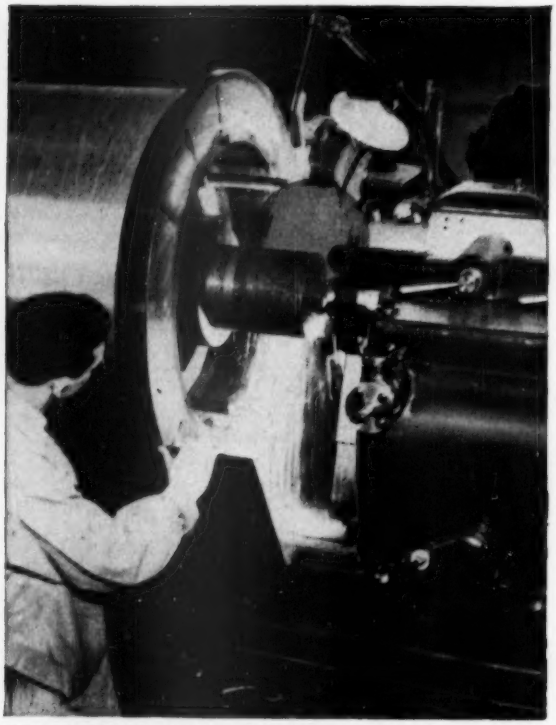
Building up to a costly letdown...



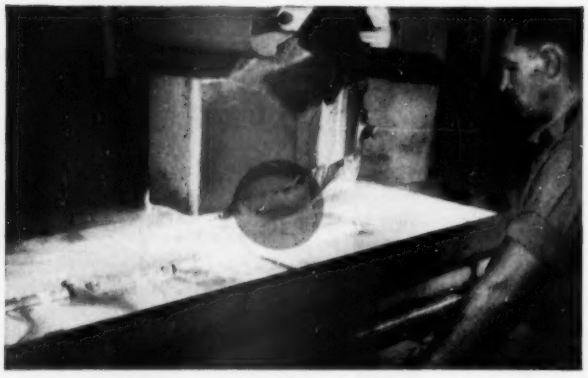
OF COURSE YOU'RE NOT—OR AT LEAST NOT CONSCIOUSLY. But perhaps you are missing a bet here and there. The sketch is intended to remind you of the importance of building a sound lubrication structure — from the bottom up. We'd also like to remind you that a Gulf Sales Engineer can give you practical help on any of these individual phases of the lubrication problem. For additional information, write, wire, or phone your nearest Gulf office.

GULF OIL CORPORATION
GULF REFINING COMPANY
Pittsburgh 30, Pennsylvania

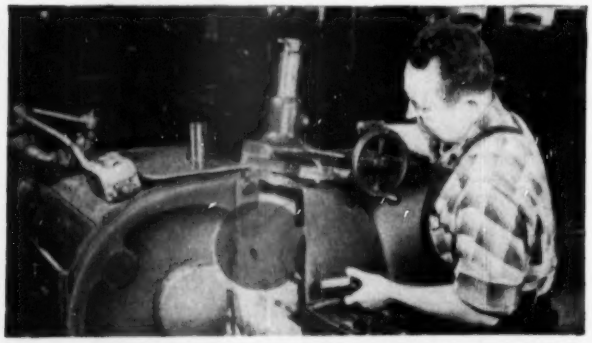
GULF SERVES INDUSTRY



YOU CAN SEE THE DIFFERENCE. The spark stream from a Norton G Bond ALUNDUM wheel is more continuous, more even, indicating uniformity of wheel structure and of cutting action.



YOU CAN HEAR THE DIFFERENCE. Norton G Bond wheels grind with the pleasant, steady swish-h-h of free, easy cutting. You hear no harsh grinding noise.



YOU CAN PROVE THE DIFFERENCE. From general purpose to high production work, every job you do with the new G Bond wheels will benefit by the unique cutting action that grinds faster, freer, and cooler.

NOW!...Boost your profits with the NEW

G BOND

for your latest Norton value-adding

"TOUCH OF GOLD"

It took five years of continuous research and field-testing to bring you the new, exclusive Norton G Bond.

Now the most efficient vitrified bond ever produced is ready to add your latest "Touch of Gold" for increased product-value — and profits — in a wide range of precision and semi-precision grinding jobs.

Secret of the new G Bond's great superiority is the way it holds each abrasive grain for maximum cutting action. Then, *just when it should,* it lets go, assuring a constant grinding surface of new grains with fresh, sharp cutting edges. It is designed to do this better than the bond in any wheel you have ever used before.

As a result, Norton ALUNDUM* grinding wheels made with the new G Bond have definite advantages that you can *see* and *hear* as they grind — and that are *proved* in the better work they turn out for less cost.

That's your newest "Touch of Gold" developed by Norton to help boost your profits and keep your operators happy. Make sure you add it to your production. And remember, only Norton offers you over 65 years of experience in abrasives, grinding wheels and grinding and lapping machines.

SEE YOUR NORTON DISTRIBUTOR

about arranging a test of the new G Bond ALUNDUM wheels in your plant. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

THE "TOUCH OF GOLD" IS JOB-PROVED. During extensive field-testing, the new Norton G Bond wheels have made a big hit with operators experienced in many types of grinding. Why not get first-hand reports on these radically improved wheels? Try them in your own shop.

7 BIG ADVANTAGES Norton G Bond ALUNDUM Wheels:

- Do more work per wheel
- Cut freer, cooler, faster
- Dress easier — more pieces per dressing
- Cover a wider range of jobs
- Hold shape — better for form grinding
- Hold corners better
- Ideal for crush dressing

NORTON ABRASIVES

Making better products to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

W-147S

BROAD USEFULNESS. The new Norton G Bond ALUNDUM wheels can boost your profits on many types of grinding, especially cylindrical, centerless, surface, internal, gear, tool and cutter, form and thread grinding, and saw gumming.

YOUR COMPANY'S BIGGEST UNLISTED ASSET

...your Local Industrial Distributor

Just reach for the phone . . . call your local Brown & Sharpe Distributor . . . within a few hours, even minutes, many of the famous products shown here can be delivered to your plant. That's service! . . . And that's one reason your Brown & Sharpe Distributor is such a great asset to your company.

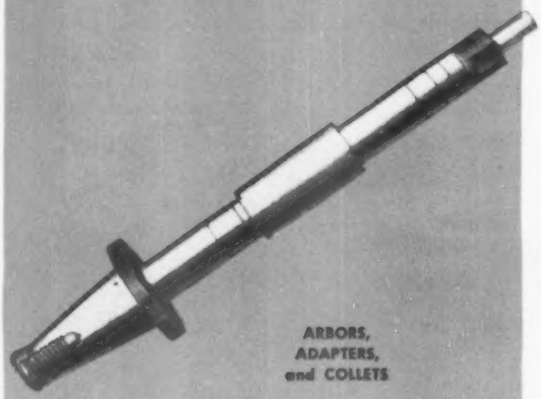
All he asks in return is the chance to serve you again. Talk over your problems with him . . . his experience gained through contact with hundreds of plants may suggest many economical solutions. He'll appreciate your consideration . . . and, remember, in an emergency he's the man who may make the difference between profit and loss for your company.

Brown & Sharpe Mfg. Co.,
Providence 1, R. I., U.S.A.

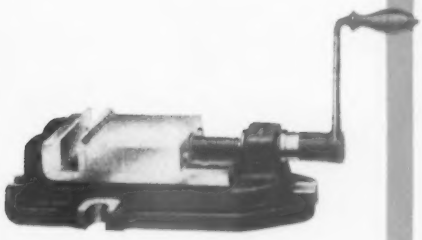
MACHINE ATTACHMENTS

MILLING CUTTERS

SCREW MACHINE TOOLS

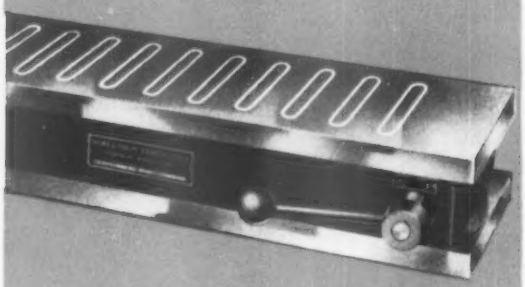


ARBORS,
ADAPTERS,
and COLLETS



VISES

PUMPS



PERMANENT MAGNET CHUCKS

MACHINISTS' TOOLS

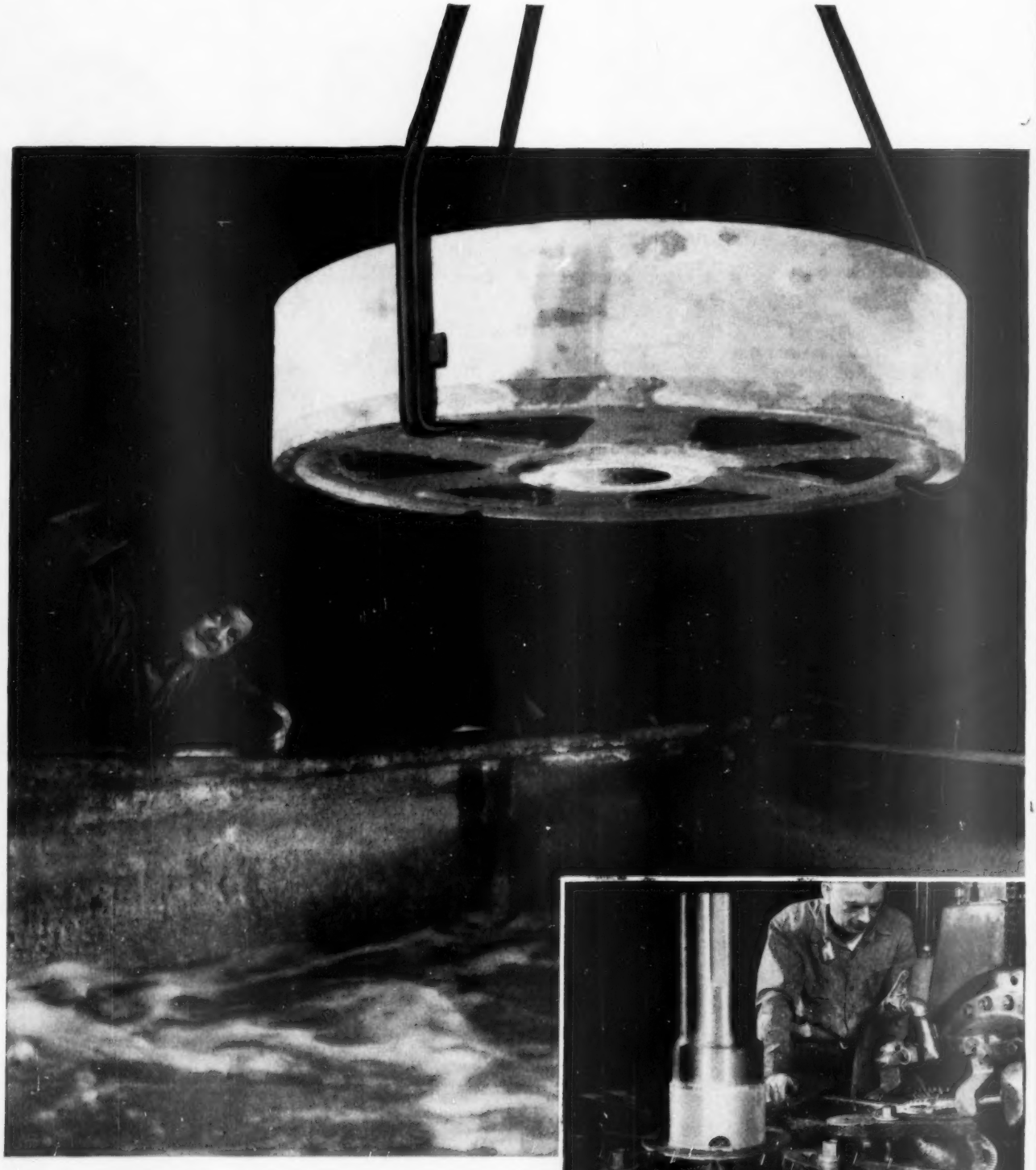
JOHANSSON GAGE BLOCKS

BUY THROUGH YOUR
LOCAL DISTRIBUTOR

Brown & Sharpe

B·S

ELECTRONIC MEASURING EQUIPMENT



After heating, all Westinghouse Gear Blanks receive this quenching in an exclusive BPT solution. Gears so processed have a tapered hardness from surface to core—absorb the shocks of everyday service.

The hobbing process, long recognized as one of the most accurate of gear-cutting methods, is used on gears for all Westinghouse Speed Reducers. It assures true gear meshing and quiet operation of the finished speed reducers.

Do your speed reducers have the added value this precise manufacturing assures?

Are you getting toughness, stamina, long life? These are qualities of Westinghouse Speed Reducers which stem from the step-by-step precision that goes into their making.

Westinghouse Gear Blanks, for instance, are made from high-quality steel that's thoroughly checked for conformity to specifications. Gears are hob cut which means precision cut. They're heat-treated by an exclusive Westinghouse BPT process that carefully tapers gear hardness from surface to core. It's your assurance of gear teeth that will resist surface wear yet absorb the many shocks of service.

Antifriction bearings on all Westinghouse Speed Reducers lessen friction loads—especially on starting. They maintain precise gear center distance. The result —permanent alignment and minimum friction loss.

The rugged cast iron gear case is made in two sections for ready accessibility of all working parts. Thus servicing is greatly simplified. Ribbing, provided at points of greatest stress, gives extra strength and rigidity with proper alignment of parts maintained at all times.

These features, together with many others that are designed, manufactured and tested to meet rigid Westinghouse standards, are the result of over sixty years' experience in the design and manufacture of gearing. This adds up to speed reducers that give year-in, year-out, trouble-free performance. Investigate the full line of Westinghouse Gearing Equipment wherever speed reduction is required. Your local Westinghouse representative will be glad to furnish any information. Call on him at any time or write, Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-07332

YOU CAN BE **SURE**...IF IT'S

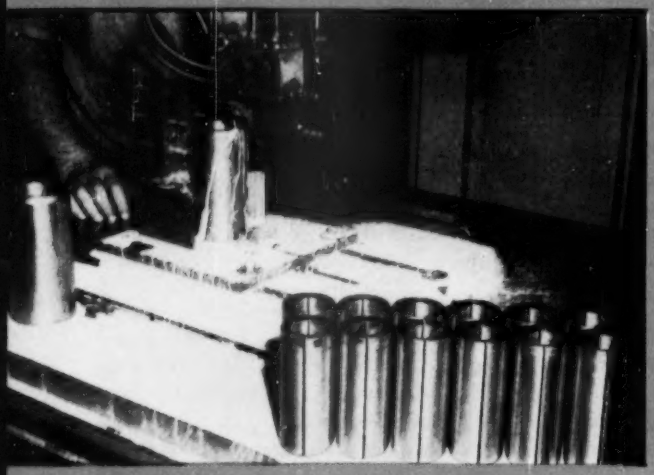
Westinghouse

All machined parts are thoroughly inspected at each step of manufacture to assure the high degree of accuracy necessary for smooth operation. Hobs and other tools are also checked repeatedly to control uniformity of gears produced.

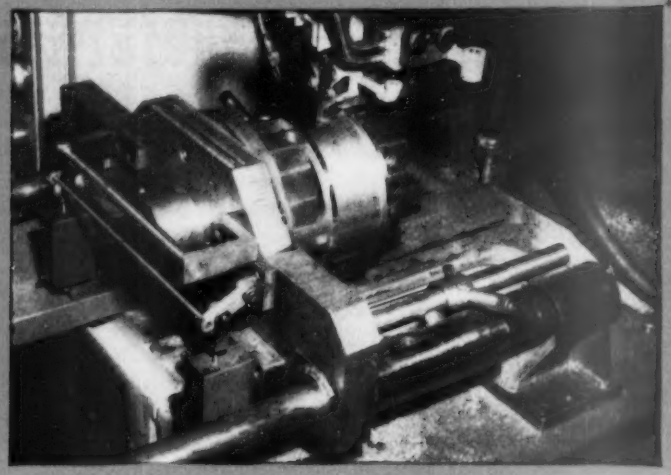
Before shipment, each complete speed reducer is given a running test under load. These tests enable Westinghouse to determine in advance the performance of each unit under conditions approximating actual service.

PRODUCTION

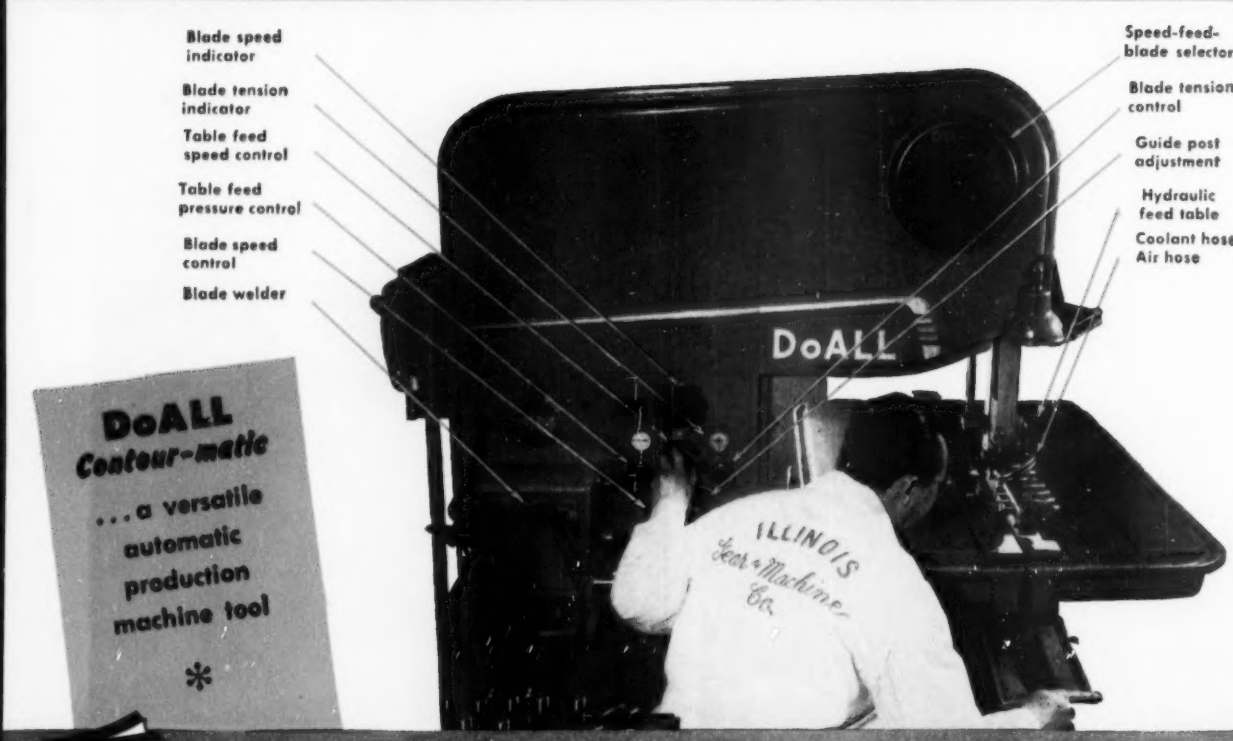
Low Cost Answer to Many Operations



SLOTTING Slotting bushings, using fixture and special heavy gage DoALL Saw Band to produce desired slot width.

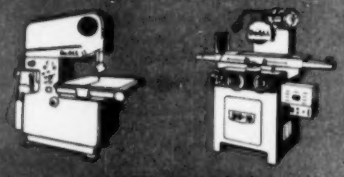


SLITTING Cutting heavy duty bearings in half. Adjustable fixture handles parts up to 11" dia. x 14" length.



DoALL
Contour-matic
...a versatile automatic production machine tool

*

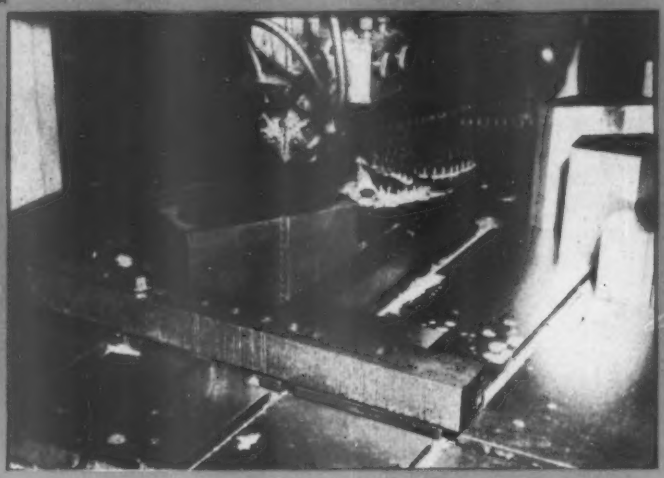


MACHINE TOOLS

CUTTING TOOLS

BANDSAWING

on Runs of Identical Parts



ANGLE CUTTING Back-up bar is bolted to saw table. An angle is bolted to back-up bar. Fully adjustable.

STOCK REMOVAL Excess stock required to hold pinions in gear cutter being removed automatically.

Use of Simple Fixtures Often Lets Bandsawing Replace More Costly Machining Methods

HOW the use of simple fixtures bolted to DoALL power feed bandsaw tables extends the usefulness of the machines in mass production work can be seen from the accompanying illustrations. Many jobs that would otherwise be performed on slower, more expensive machine tools are now being done on DoALL machines because of the user's ingenuity in devising fixtures.

The versatility of the DoALL Contour-matic makes it the preferred machine for production sawing. Variable hydraulic table feed, automatic stop, adjustable pressure coolant flow, adjustable pressure air flow to blow chips away from cut, blade speed range from 10 to 40,000 fpm, band tension control—these are a few of the features of this production machine.

To take advantage of the production economies possible with band machining, call your local DoALL Store, or write:

The DoALL Company
254 N. Laurel Ave., Des Plaines, Ill.

DoALL

38 Sales-Service Stores to Serve You—See Your Phone Directory

8-18

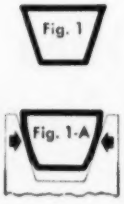
GAGING EQUIPMENT

INDUSTRIAL SUPPLIES

WHY
Gates V-Belts Wear Longer-

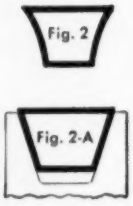
The CONCAVE SIDE (U.S. Patent No. 1813698) is what gives the Extra Wear!

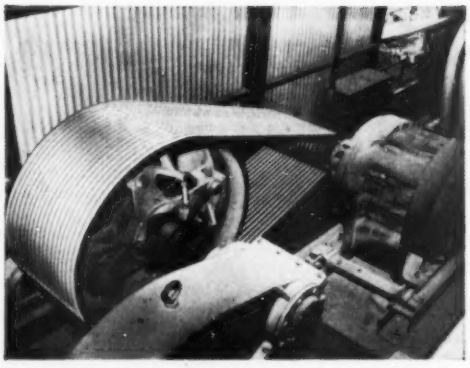
Take any *straight-sided* V-Belt (Fig. 1) and bend it as it bends in going around its pulley. You will clearly see its sides *bulge out* (Fig. 1-A). These sides therefore press *unevenly* against the V-pulley and this causes extra wear at the point shown by arrows (Fig. 1-A).



Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2).

You will see the precisely engineered CONCAVE SIDES fill out to an exact fit in the sheave-groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means longer belt *life* and *lower* belt *costs* for you.





Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

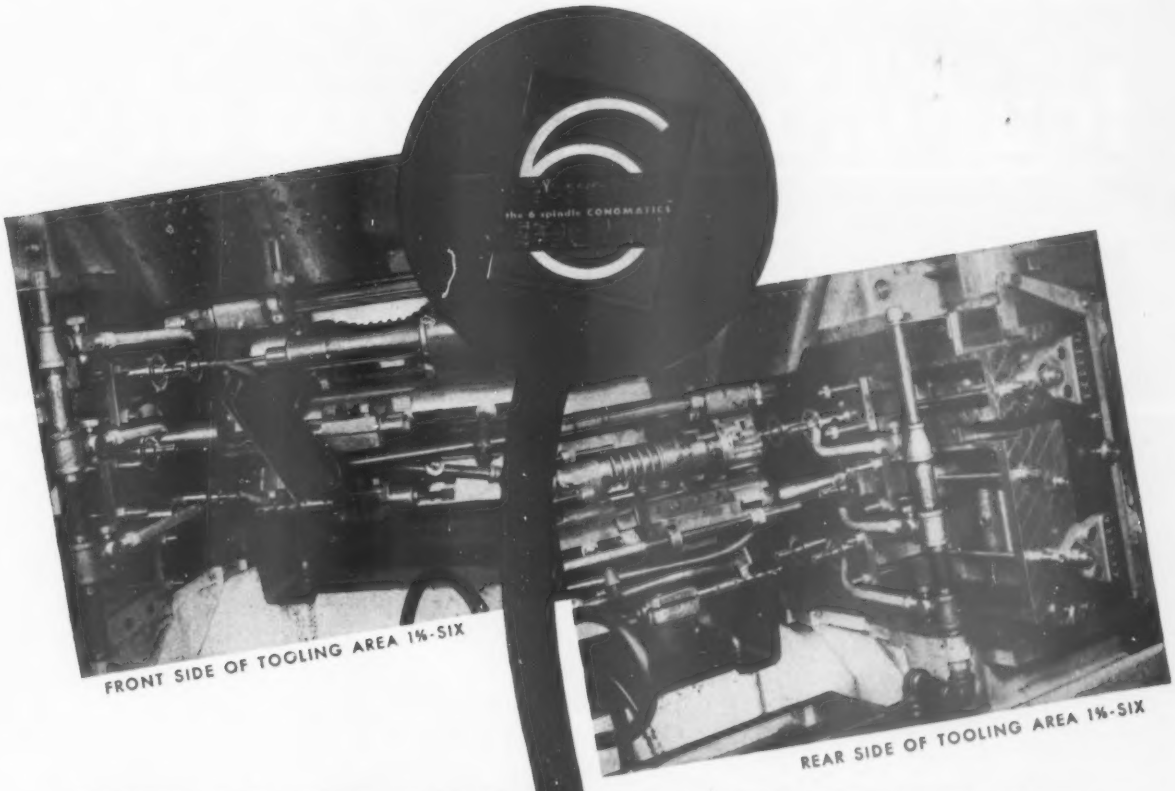
Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS-533

V-Belts — Hose
Molded Rubber Goods
for industry
World's Largest Maker
of V-Belts

Gates® VULCO ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.



FRONT SIDE OF TOOLING AREA 1⅛-SIX

REAR SIDE OF TOOLING AREA 1⅛-SIX

THE IMPORTANT REQUIREMENT

All brands of multiple spindle bar automatics offer value or they would not be on the market. If it were possible to engineer and incorporate the superior qualities of all into one machine, certain features would still be considered more important than others in accordance with the individual buyer's requirements.

But there is one essential quality required of all brands – regardless of the job. It is *dependable, low cost performance!* CONOMATIC users know well its benefits. But you don't have to be a user to know about this feature, or any other feature, of the CONOMATIC. Just write, wire, or phone for the information. There is no obligation.

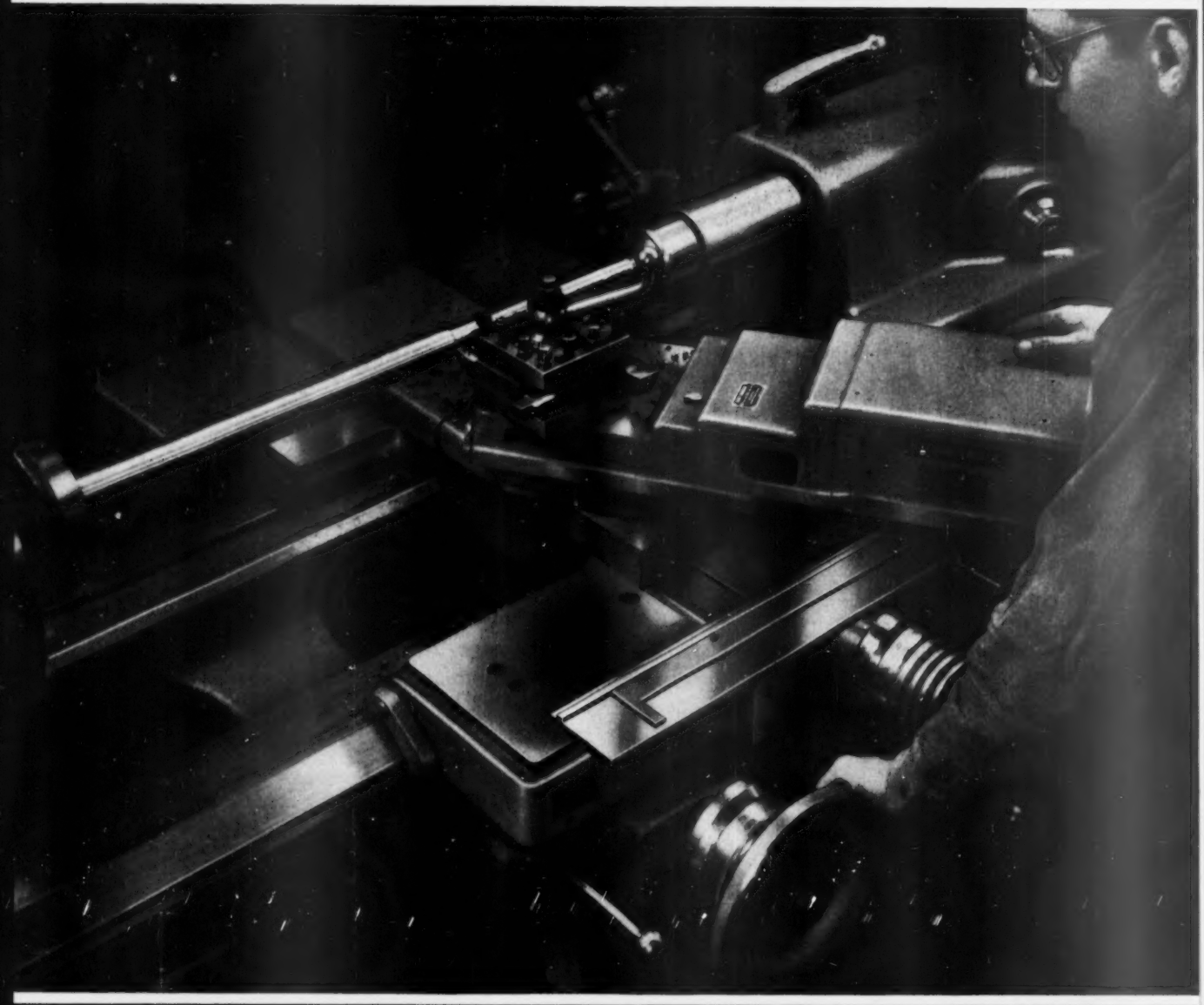
Cross drilling without costly spindle stopping is one of many CONOMATIC innovations which make use of the machine's unexcelled accommodation to tools and work. But any such facility that saves secondary handling is valuable only because of the more important "built in" qualities that keep the machine running.

A Comparison of ALL Automatics is in favor of Cone

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

NOW SCULLY-JONES TURNS

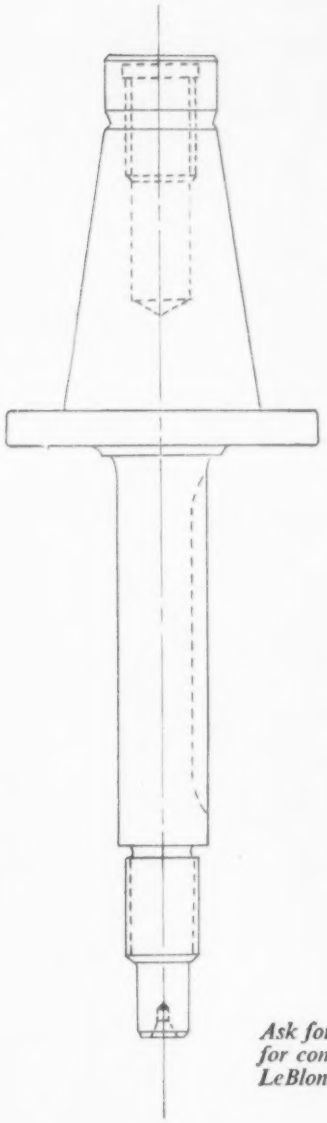
four arbors instead of 3...



Hydra-Trace (Trade Mark, Registered U. S. Pat. Off.) is LeBlond's heavy-duty hydraulic tracing attachment can be mounted in place of the compound rest on practically all LeBlond Lathes built since 1935

same time, same lathe...

plus "Hydra-trace"*



When defense needs mushroomed demand for production equipment, Scully-Jones & Co. of Chicago found itself jammed with orders for milling machine arbors (they make more arbors than anyone else). Acting on advice from engineers at LeBlond's Chicago Office, Scully-Jones added Hydra-Trace to their LeBlond 16" RT Engine Lathe. Now they turn out four arbors in the time formerly needed to produce three—same lathe, plus Hydra-Trace.

Besides boosting output, this template-controlled hydraulic tracer saves 45% on set-up time, gives uniform precision without the need of a highly-skilled operator.

Stepless form-turning, contour facing, and turning step shafts are all in a day's work for Hydra-Trace. *Fits all LeBlond Engine Lathes built since 1935,* can be mounted easily in a matter of minutes. Templates are flat, compact, suitable for both rough and finish turning. They can be produced readily in your own plant, stored in limited space.

When turning requirements call for increased output—with present machines or with new equipment—you'll find just what you need in LeBlond's complete line of lathes and lathe attachments.

Call your nearby LeBlond Distributor or write—

Ask for Bulletin HT2H for complete details on LeBlond Hydra-Trace.

turned faster by

LeBLOND of Cincinnati

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 65 YEARS*

John Coulter says, "This Model 142 SKIL Grinder with its easy handling makes grinding of these castings a lot easier. It's well balanced for either right or left hand use. I prefer these SKIL Grinders over the others we have used."

SKIL

says **Mr. Lou Grundon,** president
Little Giant
Crane & Shovel, Inc.
Des Moines, Iowa

"3 year comparison tests prove SKIL best"

Mr. Grundon knows tools and how to get the most out of them. He has orders for his Little Giant Cranes and Shovels from as far away as Serbia, Venezuela and Arabia.

"We've used 6 SKIL Grinders for 3 years in direct competition with other brands," Mr. Grundon says, "and as a result, we plan to stick to SKIL tools in the future.

"The performance of the SKIL tools has been excellent. And SKIL service has kept our production going at top speed. After trying several brands, we found SKIL the only make that gives us both performance and service."

SKIL Products Are Made Only By SKIL Corporation
formerly SKILSAW, Inc.
5033 Elston Avenue, Chicago 30, Illinois
Factory Branches in 34 Principal Cities
In Canada: Skiltools, Ltd., 3601 Dundas Street West, Toronto 9, Ontario

SKIL Corporation, Dept. FM-53
5033 Elston Avenue, Chicago, Illinois

Please send information showing how SKIL tools can save us money by increasing production or reducing handling costs.

Company_____ By_____

Address_____

City_____ State_____

WHAT *Life-Line* REALLY DELIVERS IS MORE SERVICE... LESS SERVICING

What *Life-Line* really delivers is

...more service ...less servicing

"We can't afford equipment breakdowns. We manufacture ice cream making machinery and operate franchise stores throughout the country. Store operators know very little about maintenance. We *must* select equipment that assures trouble-free performance with minimum maintenance. That's what Life-Lines give us. That's why we standardize on them."

The above statement by the chief engineer of an eastern manufacturing plant tells the Life-Line story best. Summed up it means more service, less servicing, with Life-Lines.

Take the Life-Linestarter, for example. Contacts last longer because exclusive "De-ion®" arc extinction snuffs out arcs fast . . . reduces contact pitting. Simple seesaw balance of clapper prevents accidental opening; kickout spring prevents accidental closing. Compare with any other starter and see why Life-Linestarters offer *more service with less servicing.*

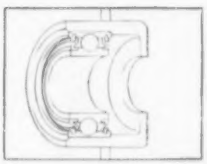
The Life-Line motor's advance design completely eliminates periodic lubrication. Pre-lubricated factory-sealed ball bearings need no greasing attention. Further, steel construction cuts breakage from rough usage. Superior insulation and winding techniques lengthen electrical life. On-the-job reports of a half million Life-Lines show why you get more service with less servicing.

It costs no more to get Life-Line performance. Ask your Westinghouse representative for details or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-21684-A

YOU CAN BE SURE...IF IT'S

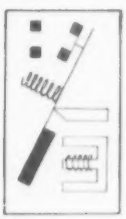
Westinghouse



MOTOR

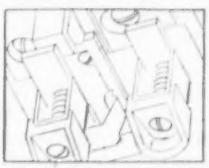
Needs no lubrication. Pre-lubricated factory-sealed bearings eliminate troubles due to under or overlubrication, dust and dirt.

Cuts winding burnouts. Pear-shaped slot design eliminates pockets. No corner voids remain to collect dirt, moisture.



STARTER

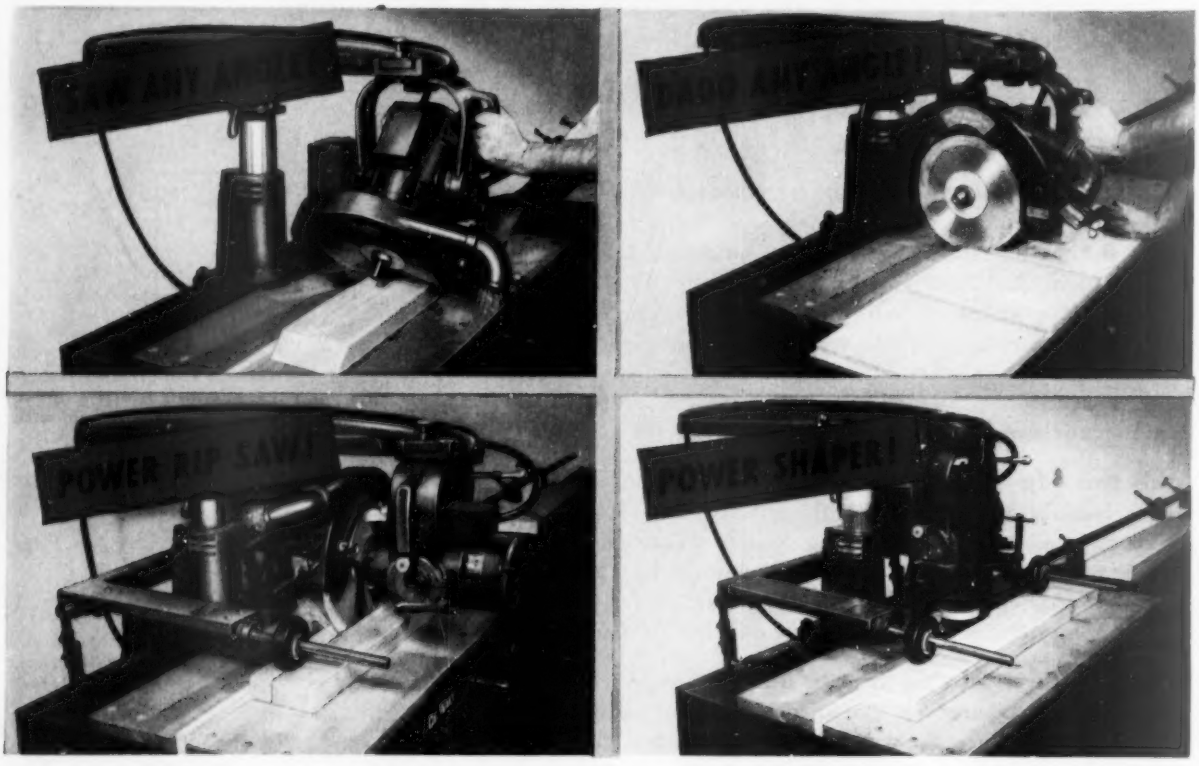
Never Jams. No sliding surfaces to wear—no sticking—no jamming—nothing to wear or replace.



Never needs filing. Silver-to-silver contacts eliminate filing. Discolored silver maintains high conductivity.

Here's why new DE WALT "3-equipment investment...saves

All the uses of a swing saw...table saw...shaper for the cost of one machine!



NOW one DE WALT® gives you all the uses of a swing saw... table saw... shaper PLUS many other machines for the cost of ONE machine.

There's no need to have your plant cluttered up with many expensive machines when ONE DE WALT with ONE DIRECT-DRIVE MOTOR brings you money-saving and profit-making advantages like these...

Save On Equipment... one DE WALT does the work. Why pay the added price for many single-purpose machines?

Save On Handling... material always moves in a straight line on the level DE WALT TABLE before and after any cut... saves the extra cost of carrying stock from swing saw to table saw, etc.

Save On Set-Up Time... make all adjustments conveniently *above* the table. DE WALT adjusts for different jobs in less than *one* minute.

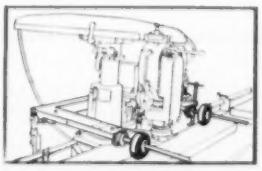
Save On Material... DE WALT reduces work spoilage because it cuts from *above*... operator easily follows the visible lay-out marks on every cut.

Saves On Floor Space... DE WALT sets along shop wall with permanent extensions... permits free flow of work through the shop because it is out of the way.

Save On Repair Costs... Powerful direct drive, totally enclosed DE WALT motor delivers full cutting power to the work... no belts, no pulleys, no special inserts to adjust and replace.

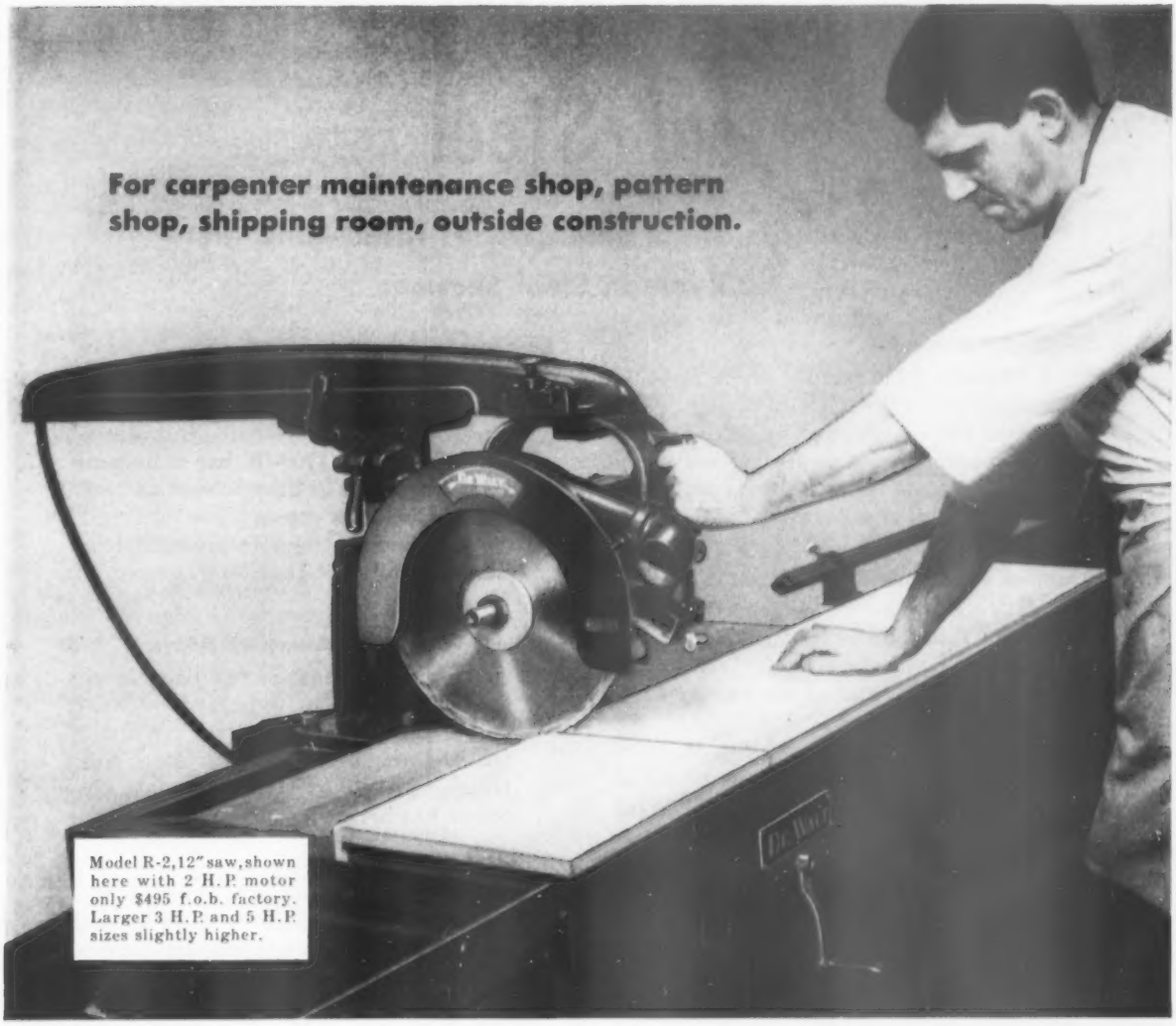
Look over your present equipment... compare and see how the new DE WALT can improve your operating efficiency and help increase plant profits. What's more... performance records for 30 years among thousands of DE WALT USERS conclusively prove that here's a SAFER SAW with PLUS VALUE in "3-DIMENSION" flexibility that keeps it busy producing profits. BUY YOURS NOW!

De Walt Machines Available in Various Types and Sizes... 9" blade to 22" blade... ½ H.P. to 10 H.P. motors. Write for catalog.



NOTE: If your ripping demands are large—De Walt Safety Power Feed steps up ripping speed to 90 feet per minute! This low-cost feed with speed changes can produce 8 times faster than average manual feed.

Dimension" stock saw reduces on materials handling costs!


For carpenter maintenance shop, pattern shop, shipping room, outside construction.
Model R-2,12" saw, shown here with 2 H.P. motor only $495 f.o.b. factory. Larger 3 H.P. and 5 H.P. sizes slightly higher.

De Walt Inc. AMF Lancaster, Pa.

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AMERICAN MACHINE & FOUNDRY COMPANY

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Take Your First Money-Saving Step . . . Mail This Coupon Today!

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☐ I would like the R-2 demonstrated (without obligation).

☐ Please send *free* 16 mm. movie on De Walt for our management group meeting.

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ADDRESS_____

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(Attach to business letterhead and mail)

Meeting Emergency Demands for Steel

Here are records of six emergencies faced—and met—by Ryerson Steel Service:

Shutdown Averted

4:30 p.m.—1000 lbs. bar stock urgently needed to avert shutdown of night operations. Order processed by office at 4:35; goes to warehouse at 4:41. Steel leaves Ryerson plant at 5:30; arrives at customer's plant (7 miles away) at 6:05 p.m.

Shipped in 1½ hours

10:15 a.m.—two plates needed immediately. With customer still on phone, Service Department alerted. Steel sheared to size and on its way by 11:45 a.m. same morning.

Night Shift Comes Through

3:00 p.m.—order phoned in for 20,000 lbs. of sheet steel. Needed (90 miles away) at 8:00 a.m. next day. Working through the night, Ryerson warehouse crew cuts the steel—loads it on truck that leaves at 6:00 in the morning. Shipment arrives at customer's plant on time.

Breakdown Saturday—Production Monday

Saturday—11:45 a.m. Emergency call. 8″ alloy steel round needed to repair breakdown of main shaft. Cut during lunch hour, the 1700-lb. bar is immediately trucked to airport; loaded on cargo plane. Customer meets plane on arrival in distant city. Repairs are completed Sunday; full production resumed on Monday.

Delivery 600 Miles Away—7 Hours

3:00 p.m.—200 lbs. of flat bars, in cut lengths, needed in a hurry 600 miles away. Just 2½ hours after receipt of order, plane takes off with steel from Ryerson. At 10:51 p.m. same day, customer has his steel.

Still Hot When Delivered

11:15 a.m.—Manufacturer reports breakdown; needs 2″ x 72″ x 10′ plate at once—must be flame cut. Plate delivered at 2:15 p.m., still hot.

Of course, out of thousands of orders, we can fill only relatively few at such breakneck speed. However, in emergencies, the world's largest steel service organization, with 15 interconnected plants, is your best source for steel. And, despite some shortages, you can also count on Ryerson for most every day-to-day steel requirement. So when you need steel—carbon, alloy, stainless—call your nearby Ryerson plant.

PRINCIPAL PRODUCTS: CARBON, ALLOY & STAINLESS STEELS—BARS, STRUCTURALS, PLATES, SHEETS, TUBING, MACHINERY & TOOLS, ETC.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

Watch for a blow-up between Eisenhower and organized labor. Dissatisfaction is growing within top labor leadership over the new Republican Administration. It could lead Martin P. Durkin to resign as Secretary of Labor within the year. This is the situation:

• Durkin, from labor, is hemmed in by the Republicans and business-minded rest of Eisenhower's cabinet. His voice is not being heard in top administration councils.

• AFL's George Meany is fuming over Eisenhower's inclination to drift on labor matters rather than stand up to them, give some leadership. (Examples: White House inaction on Taft-Hartley, break-up of Atomic Labor Panel, fumbling the Labor-Management-Public Advisory Committee.)

• CIO's Walter P. Reuther didn't like Eisenhower reviving the "old" cost-of-living index. It slowed shift to new index, cost auto workers a wage cut. CIO's choice of John Edelman for Assistant Secretary of Labor stirred feelings, too. The White House was reluctant to accept him, feared another "Bohlen" fight on confirmation. Reuther stood firm.

• Bargaining is all mixed up this year. Result of various factors. Most important, shift of power toward management side. Stems from Republican Administration, leveling of living costs, easing of manpower, Korean peace signs, long-term labor contracts.

Boils down to softer wage demands, easier settlements, reluctance to strike. Note: (1) Reuther acceptance of wage cut based on "old" index he said was "unacceptable." (2) Rubber, textiles settling without wage increase. (3) Refusal of General Electric locals in four cities to authorize national strike against GE.

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Management resistance is stiffening. More strikes are being lost, or drag on. AFL Electricians, usually "tough," called off strike at California Edison. No explanation. At General Electric's Jet Engine plant, AFL and CIO unions wonder how they can end strike gracefully. They had counted on White House intervention, didn't get it.

That's another sore point with labor leaders. They can't look for the Administration to bail them out any more when they jump too far and get in over their heads.

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Talk of a guaranteed annual wage is strictly academic this year. Look who's pushing it: David McDonald in steel; Reuther in autos. Yet McDonald can't ask for it until next year, Reuther until 1955.

But management is on notice: GAW is the next big goal of organized labor. Like pensions in 1949, union security before that.

Much research already has been done. Roosevelt set up the Latimer Committee to study annual wage idea after the War Labor Board rejected steel union demands during the war. It was debated in steel negotiations last year. Reuther has set up an advisory committee of "experts."

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Long-term escalator contracts won't be renewed by most unions. Where they can, unions are getting off the escalator. It doesn't take them anywhere when living costs are stable. And they don't like the downward movement of the past few months.

Big problem is what to do about the living-cost bonus now being paid. Reuther wants 20 cents of the 24-cent bonus frozen into base rates. He is thinking of more than just a higher floor as protection against a rapidly falling index. He also wants to narrow any differences over what wages will be paid when the escalator is abandoned, presumably in 1955.

There is no understanding that all of the bonus pay will go into the wage rate when escalation is dropped. Some employers will want to drop pay down to the base rate. Some will compromise. Others, like Sperry Gyroscope, will go along with union wishes: Put all of the bonus into the base rate. At Sperry Gyroscope, the bonus was 18 cents an hour. It's now in the wage rate.

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AFL holds the high cards in the AFL-CIO unity game just revived. That's why twelve CIO unions are on the unity committee. The AFL delegation consists of only six.

SEE PRACTICAL LABOR RELATIONS, PAGE 146

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Industrial production continues to rise. But it has been inching upward during the last three months, instead of rising swiftly as it did last fall. The most notable thing about the present industrial boom is the extent to which it is paced by automobile production. Without this, industrial production would be drifting along at an index level of around 225 instead of the present 241.

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The rise in manufacturing activity has clearly not been shared by all industries. This can be seen from the table below which shows the per cent increase in production now compared to a year ago:

Industry	*% Increase*
All industry	9%
Minerals	– 1
Electric power	9
Coal	–13
Cars and trucks	38
Iron and steel	11
Lumber	6
Machinery	11
Non-ferrous metal products	16
Textiles	12
Petroleum	4
Manufactured food	1
Chemicals	4

Automobile production has made the outstanding gain, far surpassing any other industry. Manufacturers closely related to auto production, like steel, machinery, and non-ferrous metal products, also show sizable increases. A good portion of the output of these industries feeds materials and subassemblies into the automotive plants. The only other industry that shows a large increase over last year is textiles. But this is mainly because textile production was very low a year ago.

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The whole level of present industrial activity is, therefore, heavily dependent upon automobile production. Whether all manufacturing activity can continue at its present pace depends very much on whether these automobiles can be sold.

The unrestrained optimism that is producing production miracles in Detroit is not fully shared by dealers and marketing men. Pushing production to its peak is natural from the car manufacturer's point of view. He wants to get as large a volume as possible to lower his unit costs. But the dealer has a different point of view. He wants cars at a price he can sell without biting into his margin. In practice this means a somewhat more limited volume of cars to prevent competitive price-cutting. One car manufacturer has already felt it necessary to assure his dealers publicly that inventories of cars were not too high and to cut the list prices on new cars.

Marketing facts do lend some support to auto makers' optimism. The level of income is high. Auto production has been limited for a year and a half by material controls. There is a big replacement market for the 8-million over-age cars that are due for scrapping. Consumers have shown a willingness to increase their installment debt to buy cars.

There are also facts on the other side that show the auto market may not be as lush as appears on the surface. A profound change in the auto market took place in 1950. In 1950 the market for autos ceased to be an expansion of car ownership and became an improvement in the age distribution of cars on the road. In other words, total registrations began to level off and new cars were sold more and more as old cars were scrapped.

•

Car ownership may increase slightly, but the large market now is replacement. Here there is a real road block to new car sales. It lies in the peculiar age distribution of cars now on the road. There are many more newer-model cars on the road than usual from 1 to 3 years old, due to high sales in recent year. There are also fewer medium-aged cars, from 7 to 10 years, because of World War II. The market for new cars has always depended upon the sale of used cars, the passing of cars down the line so everyone can upgrade their cars. The used-car lots now contain many recent models that are high-priced, too high-priced for many of the families who might otherwise want a better car.

The second road block may well be consumer credit. No one knows exactly how far consumers can or will go into debt. But installment buying has become very high. Between 65% and 70% of new cars are now bought on credit, compared to about 46% in 1950-51, 33% in 1948, and 55% in 1941.

LUNKENHEIMER "non-slip" HANDWHEEL

CLOSES VALVES TIGHT!

With this revolutionary new handwheel design, *ordinary hand pressure closes the valve absolutely tight, thus preventing leakage.*

Rounded lugs provide a firm, comfortable, secure grip, even when the operator's hand is wet or greasy. And the "Non-Slip" Handwheel stays cool — does not transmit excessive heat to the outer rim. Operator's hand cannot touch the top of the valve stem, which may be hot.

Only Lunkenheimer Valves have the new malleable iron "Non-Slip" Handwheel. Ask for a demonstration of its amazing performance. Hear how it will save you money by eliminating one of the most common causes of valve leakage.

WRITE FOR new bulletin describing the advanced "Non-Slip" Handwheel and demonstrating its outstanding features. The Lunkenheimer Company, Box 360L, Cincinnati 14, Ohio.

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"SERVICE PINS"
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EACH PIN represents one of the more than 2,000 Texaco Distributing Plants — reliable sources of fine petroleum products and service throughout all 48 States.

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famous Texaco Industrial Lubricants, and
skilled Texaco Lubrication Engineering Service.

Whatever your business, this combination of fine products and practical know-how can help you make your product better, faster, and at a lower unit cost.

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TEXACO

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TUNE IN: Tuesday nights on television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

Some Thoughts on the Business Outlook

Are we going to have a letdown?

Seems to us that we are heading for a mild dip in industrial activity in the second half year—at least a leveling down from the amazing increases that manufacturing activity has been chalking up for many months.

As our economists point out on the insert facing page 49, that leveling has already begun. The *rate* of increase of industrial production has started to slow down. But it has still been rising, and that means new high after new high.

There is evidence that, in many important lines (notably consumer durable goods) production volume has been running ahead of consumption. So the key to the business outlook would seem to be inventories. They have been building up—even at our high rate of consumer spending. It seems likely that we are in for a period of inventory adjustment —reduced production schedules until warehouses are cleaned out a bit.

If a dip is coming, how soon will it come?

Business is moving fast, with too much solid strength, to slow down all of a sudden. Even if business "psychology" changes to pessimism quickly, business itself has a tremendous momentum. But if the inventory adjustment that we've mentioned should coincide roughly with further cutbacks in the rate of military spending, a dip might develop. The timing for this would probably be the third quarter, possibly the fourth quarter, of the year.

How sure are we that there'll be a dip?

Not sure at all. A lot of the temper of the whole business situation depends on what happens in automobiles. And right now, in early May, we're at the crucial point of the auto selling season. If buyers lay the money (or consumer-credit signatures) on the line in great numbers, a lot of the uncertainties of the present situation would be wiped out.

There are some other developments that could tend to keep us on the upswing:

We may very well get some tax reduction, maybe effective at midyear. It seems reasonably likely that the federal budget will look near enough to balance for the Eisenhower Administration to permit (1) expiration of the excess-profits tax, and (2) some personal income tax relief.

We may see a renewal of the rising-price psychology, based on an increase in steel prices and wages. It's common talk in industry that the steel companies are contemplating a price rise this summer. We hear that the decision hasn't been made, but the outlook favors a boost.

If there's a dip, how serious will it be?

We're sticking our necks out of course, but we feel strongly that, if we get a downturn, it will be a shallow dip and not a long, steep nosedive.

This will be particularly true if industry doesn't get panicky. And the strong trend of manufacturing management to longer-term planning (see page 57) affords some comforting insurance against this.

Harry Lee Waddell

LOWER-COST PRODUCTION for today's... and tomorrow's... needs

calls for...

New Philosophy on Capital Equipment

By H. THOMAS HALLOWELL, JR.
President, Standard Pressed Steel Company, Jenkintown, Pa.

MORE AND MORE OUTPUT per man-hour will be the successful plant executive's answer to the challenge of the next 10 or 20 years for more and better products at lower cost.

And he'll boost productivity only by well-planned capital investment in better plants, production equipment, and working conditions.

THE JOB AHEAD · American industry, now producing at a peak capacity, will be operating in an increasingly competitive atmosphere. Price will become a most important factor in future sales. And, to maintain profit margins, the squeeze will be put on manufacturing costs.

At the same time, we shall have to meet a steadily increasing demand for more goods—both consumer and capital. Our population is steadily growing. Our standard of living is rising rapidly. National defense will maintain a steady drain on our productive resources for the foreseeable future.

It would be folly to hope that labor—unaided—could meet this challenge of increased demand and reduced costs. In fact, it is safe to assume that labor costs will continue to rise and the percentage of our population in the labor force will decrease. Although our population is growing, the heaviest increases in the next decade will occur in the non-working age groups under 18 and over 60.

We can't expect our people, just by working harder, to meet this challenge. In fact, the trend will be to a shorter workweek.

THE ANSWER: HIGHER PRODUCTIVITY · Plant management's answer to this challenge must be increased productivity—the production of an ever-increasing amount of goods per unit of time, per unit of floor space, per unit of material, light, heat, and power.

SPS PROGRAM · At Standard Pressed Steel we worked out a program five years ago to meet the coming challenge of increased production at lower costs. This program called for the continuing return of a large percentage of profits back into the business. We think this is a good way to share current profits with our employees and customers, and, in the long run, increase profits for our stockholders. So far we feel this program has been and will continue to be a success. We have increased output without increasing our labor force. At the same time, we now have a firm foundation for pushing forward our battle for productivity.

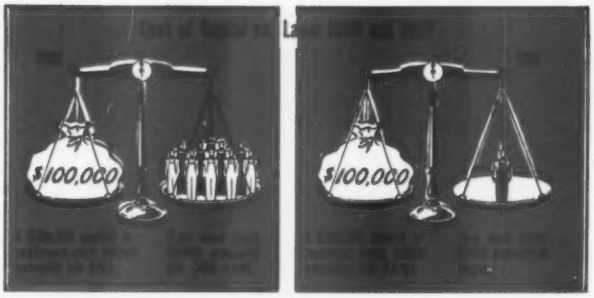
The SPS program has a platform and three main planks.

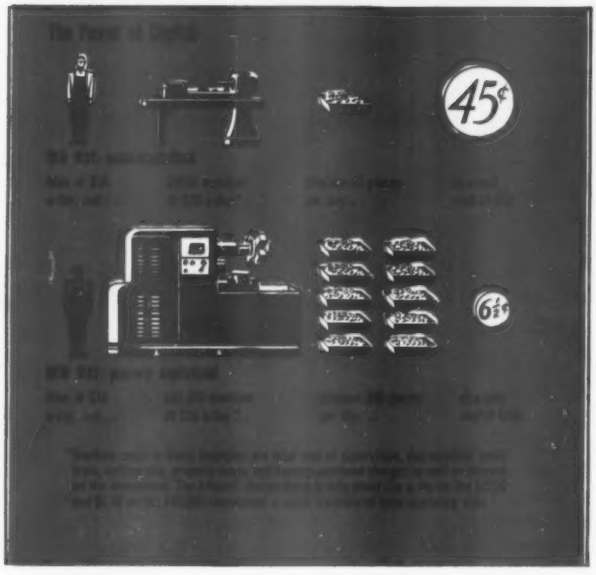
The platform: One of the most modern plants in America. *The planks*:

1. A bold attitude toward capital investment in modern plant, equipment, and working environment for our employees.
2. The pre-planning of capital investment five to ten years in advance in order to achieve maximum output per payroll employee.
3. Quality control of product based not on inspection but on the best available plant and machine tools.

This is not just a policy guide for top management. This is a working guide for plant operating management. It is the second line of management —responsible for the specification and use of plant capital equipment—that must stimulate the flow of capital into more productive plant and facilities. Middle management must lead top management to an awareness of the fact that profits wisely spent within the plant will be the key to greater output, lower costs.

But let's analyze the platform and planks of our productivity program.





PLATFORM:

A Modern Plant

Increased productivity must be built from the plant foundation up.

At SPS we realized that to maintain our position as the world's largest socket screw producer we would need the most plant possible.

The result was a $10-million expansion and modernization program that weeded out the outmoded plant structures and integrated 650,000 square feet of productive plant space under one roof.

As SPS had grown over the years, we added new buildings to its plant capacity. By 1950 the company found itself with 325,000 square feet of floor space scattered throughout many buildings. Everywhere the company turned to expand production, change layout, or improve materials handling flow, it met confining walls and corners.

This lesson learned, we started tearing down existing walls and corners and joining adjacent buildings. We built 150,000 square feet of new floor area right in the middle of the plant with no sidewalls at all. These areas were joined directly to existing structures. So were all other plant additions. The end result is an almost entirely new plant on the same site, with scarcely a day's loss in production time.

NEW PRODUCTION PSYCHOLOGY · Our new plant gives us a new freedom for plant operation—a new production psychology. We can lay out processes in more efficient sequence, integrate departments badly in need of it. We are able to adapt the latest in materials handling equipment to our process needs. We have added modern freight- and truck-loading areas to speed shipping and cut freight costs.

An immediate result through the last three years has been a great increase in output—as much as three times in one part of our company—with the same number of employees as before.

Most important of all, we have a flexible plant that we can readily adapt to the changing needs of the future.

PLANK NO. 1:

Bold Capital Investment

It is now just plain economic sense to put capital to work increasing plant productivity. The cost-balance between labor and capital has long since tipped in favor of the latter.

COST OF CAPITAL · A look at the chart (left) shows that in 1900, while the yearly cost of a $100,000 investment was $6000, the average yearly cost per worker was $600—a ratio of 10 to 1. By 1950 the yearly cost of $100,000 had dropped to $3600, but the cost per worker had risen to $3600—a ratio of 1 to 1. These are only approximate figures for interest or wages, of course. But they show that the value of capital as a replacement for labor has increased tenfold. And we can expect this trend to continue.

This example only points up the fact that management cannot afford to neglect to put capital to use in the plant for more productive equipment. Only through this capital investment will physical output per payroll dollar be increased.

POWER OF CAPITAL · For a more concrete example of the power of capital, take a machining operation (lower chart) that might be producing for you 80 pieces a day at 45¢ each. Your competitor, using other production techniques, is selling the item for 25¢. Remember, your cost alone is 45¢.

Now suppose you correctly assume that you are undercapitalized. You install a larger, better, more complex machine that has 10 times the initial investment and 10 times the production rate. Looking at the cost picture now we see that you are producing 800 parts a day at 6½¢ each! Greater productivity and radically reduced cost!

The difference dramatically reflects the effects of 10 times the amount of capital at work.

A machine tool does not have to be bigger or

NEW PHILOSOPHY

Begins on page 52

cost more in order to be more productive. A new machine of the same size will often bring a marked increase in output. We have found at SPS that in general a new 1953 machine tool can out-produce a 1945 model by one-and-a-half to three times—and the output is usually of a higher quality. Few machines in our plant are older than eight years and the average age is less than five.

SURPLUS OF MACHINE POWER · Aside from quality of mechanical equipment, we also believe in a surplus of machine power rather than manpower. There are 10 machines for every eight operators at SPS. The approximate interest on a $10,000 machine is less than $10 a week—an operator's pay for only a few hours. It's cheaper to shift a man between machines than to shift a machine from one job to another, paying for downtime on both the man and the machine.

This surplus of machines also provides flexibility and adequate production facilities when business hits its peaks. We don't keep books to measure lost profits due to inadequate facilities—to find out how much we *might* have made.

Adequate mechanization also has helped us cut costs by reducing and frequently eliminating clerical inventory personnel. By integrating the manufacture of a single product on efficient, high-speed machines we have reduced in-process times for materials and the need for in-process inventory control.

Although we have used machine tools as an example, greater productivity *via* capital investment can be attained in all plant facilities and services. Capital can be wisely invested in plant, materials handling equipment, maintenance services, and so on to increase output per square foot, per Btu. input, or per fork truck, whatever the case may be.

INCREASED OUTPUT · Here are a few examples of what we have accomplished at SPS:

- By installing an overhead chain conveyor and modernizing our press shop, we cut handling costs 75% and increased output 50%.
- By investing in a central automatic scrap disposal unit, we cut the loading time for a carload of machine turnings from six man-days to 60 man-minutes.
- By investing an additional $250,000 in finished stock inventory we were able to free 40 employees for other work in the company. We had found that lack of adequate inventory had been forcing us to ship many orders incomplete. Now we can fill better than 90% of our standard items direct from stock, eliminating a lot of correspondence with customers, in-plant paperwork, and the need for an oversize clerical force.
- By investing in our own product—separate Hallowell workbenches for each worker—we helped our men increase their individual output. We had found that seating a group of our people at one long worktable did not make for maximum productivity.
- By investing in two-way radio control, we were able to double the output of our fork lift trucks.
- By investing in locker rooms and lavatories of country-club caliber, we have helped our people to work better in a more cheerful environment. As a result, we attract more and better applicants—and those we hire stay with us longer. Thus we increase the productivity of our employee selection and training programs.

All these capital investments enabled us to increase the productivity not only of manpower but of plant facilities. There is room, in a sense, to increase the productivity of every facility in the plant through wise capital investment in newer, better equipment.

PLANK NO. 2:
Pre-Planning Capital Investment

A program of capital investment should be accompanied by a thorough blueprint of your plant's operation and equipment for at least five years in advance.

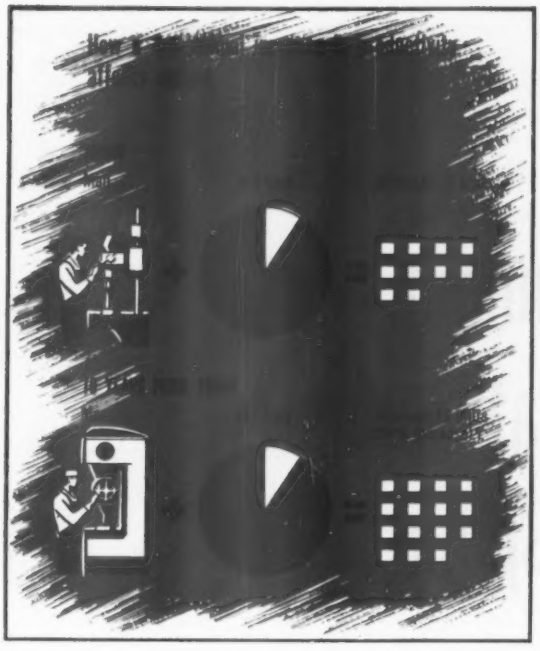
When we embarked on our plant modernization at the end of 1949, we had a detailed 10-year plan for the completion of the project. When Korea came upon us six months later, we were able to place orders for vitally needed structural steel within three weeks of the outbreak of hostilities. Furthermore, when the post-1950 boom in demand arrived, we were able to speed our plant to completion by mid-1953. A 10-year program telescoped into three because of careful planning!

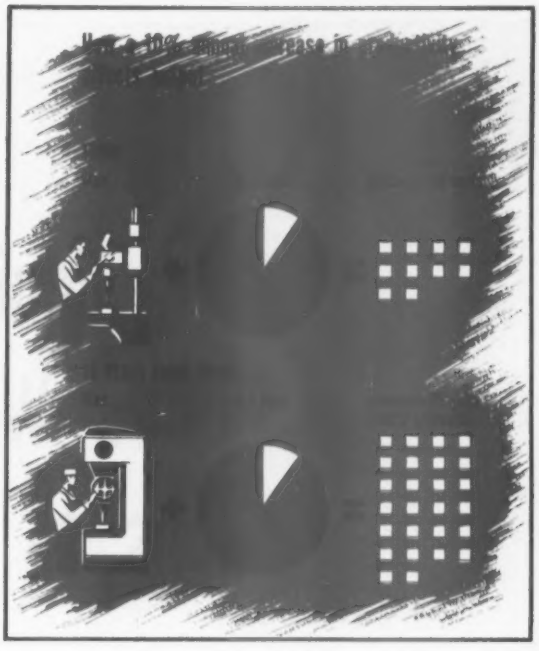
But planning should have a present depth as well as a future projection.

Planning is more than being foresighted. It also entails a careful analysis of existing needs and a wise choice of equipment to make sure that each dollar being currently spent is wisely used to insure maximum productivity.

Actually you should give as much care to the purchase of a $14,000 machine as your sales manager would give to a $1-million order—for it usually takes a $1-million sale to supply the profits needed to buy that machine.

FOR EXAMPLE · Let's assume that out of a $1-million sale, $800,000 represents cost. Profit before taxes is then $200,000, and if yours is a top-bracket company, paying the highest tax rates, $144,000 of this profit will be taken by the government. That leaves a profit after taxes of $56,000. Many companies pay





half their profits in dividends, leaving a $28,000 increase in net worth. Let us assume that "fixed assets" are approximately half of net worth. So out of our $1-million sale we have left $14,000 for the purchase of a new machine tool.

When the value of capital investment is placed in these terms, it is easy to see why plant executives will have to spend more time wisely allocating their funds to the most advantage.

Then, too, through proper planning, productivity can be made to increase yearly in geometric proportions. A small increase in productivity, compounded annually, mushrooms to imposing proportions over a period of years.

Our standard of living, which is closely related to our productivity, has in the past 50 years increased at the rate of 1½% annually. This is not an imposing yearly advance. But it is enough to more than double our standard of living over the past 50 years.

It will be to management's advantage to consider plant productivity in these same long-range terms.

A small increase in productivity can greatly increase output in the future. For instance, $1000 compounded annually at 2% produces an increment of $1691 in 50 years. Double the annual interest to 4% and you do not double your gain—you come close to increasing it four times.

Plan well to increase your productivity even slightly and the long-range results can be the same.

The chart above shows that a maintained increase in productivity of 4% a year will, in 10 years, increase output by 50% or reduce needed man-hours by one-third for the same output. Now maintain an annual increase of 10% over the same period and in 10 years you have increased output 160% or reduced payroll hours by 60%.

An annual 10% increase may seem like blue-sky thinking. But we didn't think so. It's a goal worth shooting for—and one that has been attained by at least one industry. A check of the Bureau of Labor Statistics will show you that from 1939 through 1950 the rayon and synthetic fiber industry increased productivity exactly 10% per year.

PLANK NO. 3:
Quality Control of Product

The successful plant, to stay competitive, must produce a product not only at lower cost but also with higher quality. We have set a high standard for our quality, and we are using capital investment to attain it.

We have found that appreciable gains in product quality can be achieved only with better facilities that are capable of producing a better product—bigger, more expensive tools to hold closer tolerances, modern plant and services to improve working conditions, and a stepped-up program of improved employee facilities and benefits to help us foster a quality-conscious attitude among our people.

Four years ago, with product defects found and corrected in our plant running well beyond our tight standards, we scrapped our conventional system of inspection and went after better quality through capital investment. Four years later, with product rejects on our main line almost negligible, we know that our investment has paid off.

LOWER-COST PRODUCTION
for today's...
and tomorrow's...
needs

calls for

New Equipment — Here's What Industry Plans to Spend

Manufacturers expect to pour another $12-billion into new plant and equipment in 1953, according to the annual survey of the McGraw-Hill Department of Economics, just completed. Emphasis in spending has shifted from expansion to modernization.

INDUSTRY BREAKDOWN OF SPENDING FOR PLANT AND EQUIPMENT

	Millions of Dollars				
	Actual	Planned	Preliminary Plans		
	1952*	1953	1954	1955	1956
Steel	$1,538	$1,246	$748	$623	$785
Machinery	772	749	577	532	502
Electrical machinery	376	549	483	395	302
Automobiles	896	1,066	949	768	693
Transport equipment (including aircraft)	253	309	182	56	37
Food	785	879	686	677	677
Chemicals	1,451	1,364	1,309	1,228	1,350
Petroleum and coal products	2,596	2,908	2,792	2,588	2,530
Textiles	400	396	368	305	281
Other manufacturing	2,927	2,634	2,028	1,817	1,817
ALL MANUFACTURING	11,994	12,100	10,122	8,989	8,974

*United States Department of Commerce

The amount of capital expenditures planned by business is still rising. In 1953 manufacturing firms expect to invest about 1% more than last year.

Steel, machinery, and chemical industries will decrease capital expenditures somewhat in 1953. Food and petroleum will continue about the same. The big industry increases will come in automobiles, electrical machinery, and transportation equipment.

By product lines, largest increases are found in agricultural machinery, office and store machinery, rubber, and oil refining. Other groups making large increases in capital expenditures are shoes, furniture, and engines.

Products with less capital spending in 1953 than last year include paper, glass, non-ferrous metals, most lines of machinery, and rayon chemicals.

HOW COMPANIES PLAN TO EMPHASIZE MODERNIZATION

Expansion versus Modernization in Capital Spending

	1952		1953		1954-56	
	Exp.	Mod.	Exp.	Mod.	Exp.	Mod.
Steel	62%	38%	41%	59%	22%	78%
Machinery	55	45	50	50	52	48
Electrical machinery	57	43	60	40	49	51
Automobiles	36	64	28	72	52	48
Transport equipment (including aircraft)	77	23	55	45	17	83
Food	28	72	45	55	17	83
Chemicals	76	24	71	29	67	33
Petroleum and coal products	42	58	40	60	39	61
Textiles	30	70	17	83	11	89
Other manufacturing	42	58	37	63	31	69
ALL MANUFACTURING	49%	51%	43%	57%	38%	62%

An increasing share of capital spending is going into modernization rather than expansion. Take a look at the last line in the table to the left to see the marked shift. The fact that the 1951 split (not in table) was 58% expansion and 42% modernization for all manufacturing makes the shift even more dramatic.

Reason for the increase in modernization spending is not hard to find: The new units brought into being through expansion programs were far more efficient and lower-cost producers than their "older brothers." In the developing competitive market, the pre-expansion plants now require extensive modernization to be able to match costs with the new capacity. And the plant that can't match costs with the best in its industry seems headed for sure trouble. The figures on spending for modernization seem to indicate that a good share of industry understands that fact.

HOW FAR AHEAD DO COMPANIES PLAN CAPITAL EXPENDITURES?

Per cent of Companies Answering

	More than 5 yrs. ahead	More than 4 yrs. ahead	More than 2 yrs. ahead	1 yr. ahead
Steel	13%	50%	63%	100%
Machinery	0	9	50	100
Electrical machinery	0	27	93	100
Automobiles	0	14	86	100
Transport equipment (including aircraft)	0	0	29	100
Food	0	18	64	100
Chemicals	0	15	75	100
Petroleum and coal products	0	21	79	100
Textiles	0	6	69	100
Other manufacturing	5	20	57	100
ALL MANUFACTURING	2%	16%	63%	100%

Most companies plan their capital spending more than two years ahead. In most industries, a significant percentage plan more than four years ahead.

One key reason for this forward planning is this: Everyone wants his dollars of capital spending to go as far as possible in taking advantage of available technical improvements. Yet businessmen reported in the survey that they could spend half again as much as they now plan for 1954-56 to take advantage of all technical advances.

That's probably why businessmen are doing more long-term planning than previously—even though the number of firmly committed long-term programs (mostly for major expansions) is less than last year. The number of companies able to give *preliminary* figures for capital spending plans four years ahead is now 81%, compared with only 65% in 1952.

Additional information from this McGraw-Hill survey will be found in the article beginning on page 62.

LOWER-COST PRODUCTION for today's... and tomorrow's... needs

can help you tap . . .

Huge Consumer Demand

By ARNO H. JOHNSON • Vice President
J. Walter Thompson Company, New York

THERE ARE SOME IMPORTANT PRESSURES in our economy that are pushing us toward an opportunity for a substantially higher standard of living in the next few years.

To realize this opportunity, we must improve our productivity and real purchasing power still further—and do this at lower cost. This means we need *more* improvement in our tools of production, and greater efficiency in production, distribution, and selling of industrial as well as consumer goods. We need these things so that we can give the consumer more value for his dollar, thereby induce him to exchange *more* of his dollars for goods and services.

Instead of fearing possible cuts in defense or other government spending as a signal for depression, let's examine the opportunity for just the opposite—a rapid expansion in our standard of living that will need expanded industrial facilities.

Here are some of the facts to consider:

1. Between the war peak of 1944 and the postwar low of 1947, we survived a cut in defense expenditures equal to $125-billion in present prices. That's six times as great as the $20-billion cut we may now face. Yet our real standard of living (personal consumption per capita) had advanced by 26% over our prewar high level of 1940.

2. Now, in 1953, a 10% increase in consumer purchase of goods and services would more than offset a $20-billion cut in defense spending.

An analysis of consumer expenditures shows that only about 10% of the present total falls in classifications where there is any serious conflict with the military program. Included in this "conflict" area is the entire group of consumer durables such as refrigerators, washing machines, sewing machines, electrical appliances, radios, TV sets, and automobiles. So the $20-billion increase in consumer spending could come without serious interference with a continued rather high level of defense activity.

3. There is an opportunity for purchasing power in 1953 to be at the highest level in history.

Present trends point to a 1953 level of $255-billion of disposable personal income after taxes—enough to increase consumption expenditures by $20-billion over the 1952 level of $215-billion, and still allow a continued level of $20-billion in personal savings. (Price changes from 1952 to 1953 have been so small that these figures are entirely comparable.)

4. In 1953, with consumer prices steady (or, in some areas, declining slightly), the American people will have 78% more *real* purchasing power with which to buy physical units of goods and services than they had in 1940. This is after taking into account increased personal taxes, and after correction for inflation of prices.

The present high level of income in the United States, resulting from war and defense stimulation, along with inflation, has obscured the opportunities for a still higher real standard of living. The level of prosperity may appear high, but it is not nearly so high as it should be.

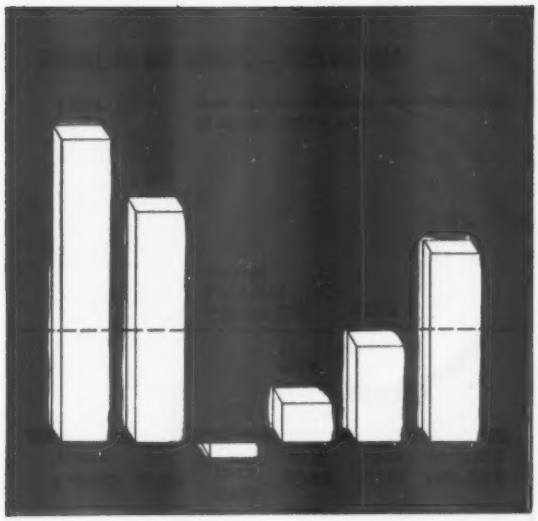
Five powerful, but largely hidden, internal pressures for expansion are building up in our economy. Some of the pressures are nearing explosive strength. All will have a strong influence during the next five years, both culturally and spiritually as well as in a material sense.

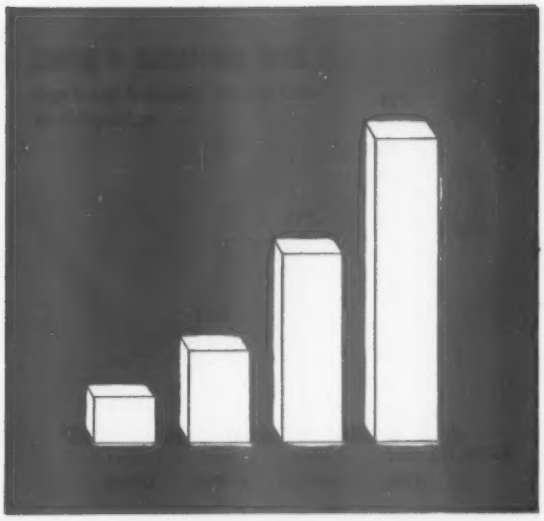
1. Change in Population Age Groups

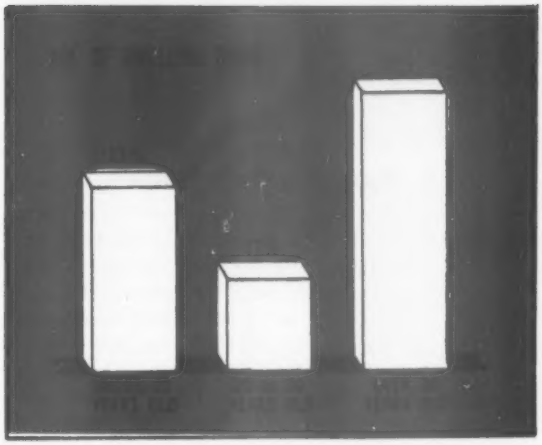
Today, we have 65% more children under 5 years old than we had in 1940; and 50% more in the 5-9 year group. At the "other end" of the age spectrum, we have 42% more people 60 years and older. These figures compare with an increase of 22% for the population as a whole.

The huge increase in the number of children has already started to cause public outcry against inadequate school facilities and teachers, as well as against juvenile delinquency. As more of this group reaches school age, demand for remedial measures is almost bound to be irresistible.

Indications are that this big increase in the number of youngsters is not just a temporary "hump" in the population curve. The birth rate has con-







tinued at a level far above earlier predictions by population experts. This increase in the birth rate comes only in part from the increase in the number of marriages. (In fact, the number of marriages may be expected to drop in the near future, because of the small number of people now in the 10-19 year group who will supply most of the marriageable couples over the next decade.)

A major factor in holding up the birth rate has been the change in attitude toward having more than one or two children. For example, the number of mothers bearing a first child is now 47% above 1940. But the number bearing second, third, and fourth children has gone up 91%, 86%, and 61%, respectively.

So much for the growth in number of young people. The oldsters, too, will create new and different markets. This will be particularly true as we begin to feel more nearly the full impact of Social Security, pension plans, and fixed retirement age. We'll have fewer "indigents" and more economically self-sufficient people in a group with lots of leisure time and many special tastes and requirements.

2. Change in Educational Level

As of 1953, the number of adults (over 20) who have had a full high school education is 4½ times greater than in 1930, and 80% greater even than in 1940.

This change is—and will continue to be—an important influence on accelerating the desire for a better standard of living.

And, as the editors of FACTORY have often pointed out, this rising standard of education will make itself felt in the plant as well as in the buying place. Better-educated workers will want not only better living conditions at home, but also better jobs. Particularly will they want jobs that are intellectually challenging rather than mere routine. These are just the sorts of jobs that must be filled in ever larger numbers as advancing technology makes higher productivity possible. We are fortunate, indeed, that this pressure of higher education is working from both ends at once—the plant and the market place—toward the common goal of higher living standards.

3. Age and Obsolescence of Dwellings

Approximately half of the 48½-million dwelling units in the United States are over 30 years old. Two-thirds are 20 or more years old. The mere fact of age and the deterioration of years has made many of these older units completely unacceptable by today's standards.

More important is the fact that these units were built at a time when the majority of our population had an income of perhaps one-third to one-half of what it is today. Put another way, these units are often "on the wrong side of the tracks."

Turn the page

Begins on page 58

Consider, for example, that in 1950 there were still 7-million non-farm units without private toilet or bath (roughly one in six of all non-farm units).

Perhaps most important of all, however, is the fact that these older units went up at a time when radios and electric refrigerators were in their infancy; television, fluorescent lighting, deep freezers, "automatic" laundries and dishwashers, and home air conditioning were unheard of.

These changes, superimposed on housing conditions of a past generation, are creating what amounts to a "technological obsolescence" of a great percentage of our housing units.

While new construction has been providing about a million new units a year since 1946, this has just barely taken care of the growth in the number of families. There is still the almost immeasurable demand resulting from still more new families, replacement or modernization of "obsolete units," and providing the larger units needed to accommodate today's larger-size families.

4. Increase in Motor Vehicles

The 55-million motor vehicles on the road in 1953 represent an increase of 72% since 1940, and an increase of 160% since 1932.

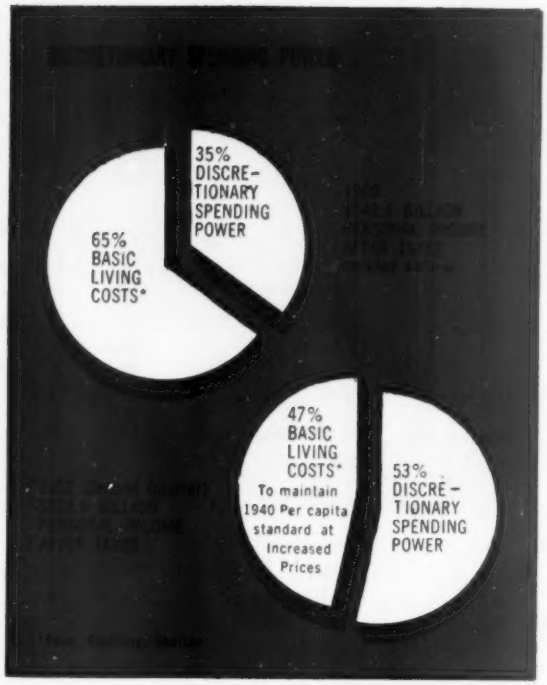
And the number of cars will continue to increase. Higher income levels, more individual homes, the move to the suburbs, more children per family, and larger numbers of women employed all point to more two-car families.

Apart from the pressure this will create for road construction (and reconstruction), and garages and parking facilities, more cars will give the population greater mobility than ever before. It will open up new markets, bring a demand for many new services. Just look at the growth of the motel business in the past few years.

5. Change in Farm Population

While our national population *grew* by 20% from 1940 to 1952, farm population *dropped* by 18%. It's down from 30.5-million to 24.8-million, and still falling.

For the most part, those moving away from the farms have been low- and marginal-income farm families, seeking (and finding) higher incomes in industrial and commercial surroundings. This has resulted in raising the general income level in two ways—by transferring the low-income farmers to (usually) higher-income urban employment and by increasing the *per capita* income of those remaining on the farms. That latter sounds almost contradictory, but with the recent dramatic increases in farm productivity, the smaller farm


35% DISCRE-TIONARY SPENDING POWER
65% BASIC LIVING COSTS*
47% BASIC LIVING COSTS* To maintain 1940 Per capita standard at Increased Prices
53% DISCRE-TIONARY SPENDING POWER

population has been able to meet (and often exceed) the demands of our growing national population. The net effect has been to raise *per capita* income of farmers by 275% since 1940, as against an increase of 195% for the population as a whole.

One indication of what this farm-income change has meant is the fact that 84% of farm families now have electric service, against 11% prewar.

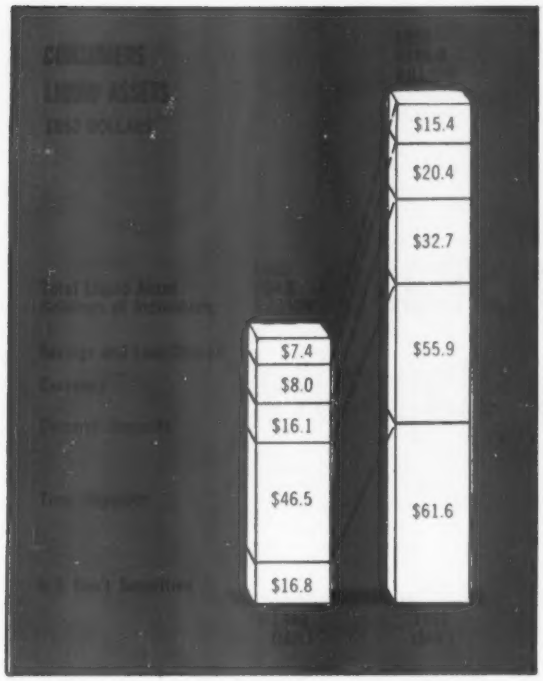
Does the Purchasing Power Exist?

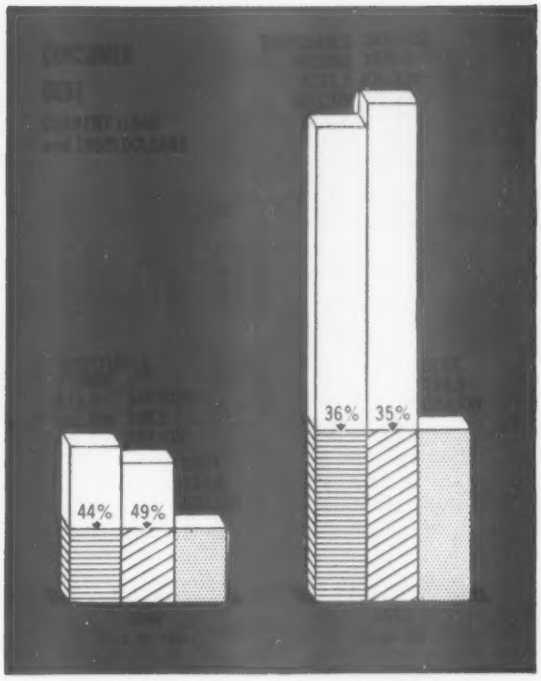
We have already seen that *real* purchasing power (what the economists call disposable income in constant dollars) is up 78% from the 1940 level. In other words, our people could buy 78% more units of goods and services on a cash basis.

This total is impressive, but it has to be broken down into its parts to see the really significant fact. That's because the consumer doesn't really have a completely free choice in how he spends his disposable income (after taxes). Some of it has to go for food, clothing, and shelter. True enough, even on these basics the consumer may choose to buy Product A instead of Product B.

DISCRETIONARY SPENDING · For a given standard of living, however, the *amount* of spending on food, clothing, and shelter is fixed. Whatever remains is called money available for "discretionary spending"—the consumer may spend it any way for any thing, or he may not spend it at all.

To get some measure of the impact of changes in discretionary spending, let's look at 1940 *vs.*





1952. (To keep the figures consistent with the 78% increase in total real purchasing power, we'll talk in 1952 dollars.)

In 1940, we spent 65% of our disposable personal income for basic living costs—food, clothing, and shelter. That left only 35% available for discretionary spending.

Now, *if we had continued the same standard of living on a per capita basis with regard to food, clothing, and shelter*, the expenditure for those items in 1952 would have been only 47% of our total disposable income.

If we subtract 1952 expenditures for a "1940 standard of basic living costs," we find 53% of disposable income (against 35% prewar) available for discretionary spending. More important, in terms of 1952 *dollars*, it is equal to 244% of the sum available for discretionary spending in 1940.

CONSUMER LIQUID ASSETS • What is happening to this tremendous amount of discretionary spending power? Well, in 1951 and 1952 almost one-sixth of it went into personal savings ($18.8-billion in 1952). Added to the tremendous savings of the war years, this has brought our total savings to a total of $243-billion. Even if the long-term investments are eliminated, the liquid assets of consumers stand at $186-billion, or double 1940.

But simply to say "double 1940" doesn't tell the whole story. That's because $57-billion of this amount is in U. S. Savings and Defense Bonds. And these bonds are instantly convertible to cash at the holders' options. This will be an important factor in sustaining and stabilizing purchasing power.

CONSUMER DEBT • Of course, consumer savings aren't all immediately spendable. There's a sizable consumer debt: $63.5-billion in mortgages and $21.0-billion of short-term loans (installment buying, etc.). As a percentage of either disposable income or savings, however, consumer debt today is approximately one-third lower than it was back in 1940.

As an extreme case, if all debt were to be paid off, consumers would still have more than $100-billion of liquid assets. That's the minimum figure you can arrive at for money—in addition to current income—spendable on a discretionary basis. It's a tremendous potential market—*if the value per dollar can be made sufficiently attractive to consumers.*

But the fact that purchasing power is available doesn't assure sales or production. Even the hidden pressures for expansion don't guarantee conversion of purchasing power potential into goods and services for our growing population.

Our economy is based largely on *created* human wants rather than "needs" or necessities. This makes production and the selling of that production increasingly important as an economic and social force. Wants and desires necessary to expand markets for our production are increasingly a matter of choice and discretion rather than economic need.

All of this indicates that as defense needs slacken off, we will have the basis for an unequaled peacetime prosperity based on an increased standard of living—if we will take advantage of the opportunities in our proved ability to produce.

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Dramatic Increases in Competitive Capacity

BY CARROLL W. BOYCE • National Affairs Editor, FACTORY

MUCH OF TODAY'S CAPACITY can't produce at a profit in a competitive market.

We hear some fears expressed occasionally that we are heading toward a condition of "excess capacity." Actually the only "excess" capacity we have today—or that we have in prospect—is inefficient capacity.

Nobody knows—for sure—just exactly what "inefficient capacity" is, as a matter of general definition. Everybody has to determine it for himself, and in terms of his own particular situation. As you look at your own capacity to see whether it's competitively efficient or inefficient, keep this key fact in mind:

If your productivity level is lower than your competitor's, either you'll be undersold or you'll have to sell at too small a profit to stay in business. As long as demand exceeds supply, price tends to be set by the "least efficient" producer in an industry. But as added capacity, which is almost always more efficient capacity, begins to produce, price is determined more nearly by the average producer. If competition gets really sharp, it tends to be set by the costs of the most efficient producers in the industry.

In checking up on your efficiency, make sure you don't get misled by cost accounting figures that sometimes lump together efficient and inefficient operations.

EXAMPLE • The president of an electrical manufacturing company complained to his operating executives that unit cost and breakeven points were too high on a certain product line. But the product was being made in two different plants.

Separate cost analyses showed that in one plant (over 50 years old) unit costs were so high the company was actually taking a loss on every unit sold. Unit costs in the plant built for post-war expansion (and not primarily to get lower cost) were providing a comfortable margin.

Breakeven point in the new plant was about 65% of capacity. For the two plants, it was over 90% of combined capacity—because of the loss suffered on every unit from the old plant. Although a new plant is now planned, the company continues to operate the old one to hold its share of the market. When the new plant gets into operation, the company's combined capacity for the product line will be considerably greater than before. And, with the lower unit cost, it expects to take an additional share of the market away from its competitors.

The company described above isn't the only one that expects to increase its share of the market by becoming more efficient in the near future. The latest annual survey by McGraw-Hill's Department of Economics shows that manufacturers expect industrial sales generally to increase 10% by 1956. But the individual companies expect to increase **their** sales by 15%. And it's the companies that plan the largest spending for new plant and equipment that expect to score the biggest individual sales gains. (See table at top of opposite page.)

From a strictly competitive point of view, these plans add to the urgency for companies to make dramatic and almost immediate increases in their productivity. Not 5% or 10%—but 100%, 200%, and more.

For many companies, doubling and tripling productivity isn't an impossible dream. It doesn't have to wait on new technology. It's a pure-and-simple

matter of catching up with what is already being done by the leaders.

EXAMPLE · Among manufacturers of fluorescent lighting fixtures, there is a ratio of better than 5 to 1 from the least efficient to most efficient in the number of man-hours to make a unit. According to the Bureau of Labor Statistics (source for those figures), the manufacturers being compared are turning out virtually the same product, have the same product mix, and do approximately the same degree of subcontracting.

In other words, there's at least one manufacturer in that industry with an opportunity to increase his productivity 400% by doing nothing more than adopting the equipment and methods which have already been installed by his competitor.

To get some idea of the opportunity—and challenge—just take a good look at the variation in performance records in eight industries of which BLS has made a careful study. These were chosen for study because relative "standardization" of product, mix, and subcontracting within the industry made collection of comparable figures easy. Chances are that other industries would show equal variations, perhaps greater. (See table below.)

In many instances, "catching up" on productivity will require entirely different technology than has been used in the plant before (although it's being used elsewhere in the industry).

Keeping up with the leaders will also require that you be alert to new technology. Dramatic advances in both products and processes may completely upset today's "pattern" of comparative levels of productivity.

EXAMPLE · Vannevar Bush, one of the nation's leading scientists, describes a new method of photographic typesetting like this: "It is the third milestone in the history of printing." The first two: individual characters, and movable type (by Gutenberg, 500 years ago!). Made by Photon, Inc., Cambridge, Mass., first production models will be delivered this summer.

But it may simply require new equipment and modern methods based on the same technology.

EXAMPLE · Let's look at a West Coast company that has two plants standing almost side by side. Both are "modern" plants by almost anybody's standard, but the newer was com-

COMPETITIVE CAPACITY

Begins on page 62

pleted only about a year ago. Size of the plants and of the processing equipment is the same. Both make exactly the same product, and by basically the same process. The same management group is in charge. Workers are drawn from the same "pool."

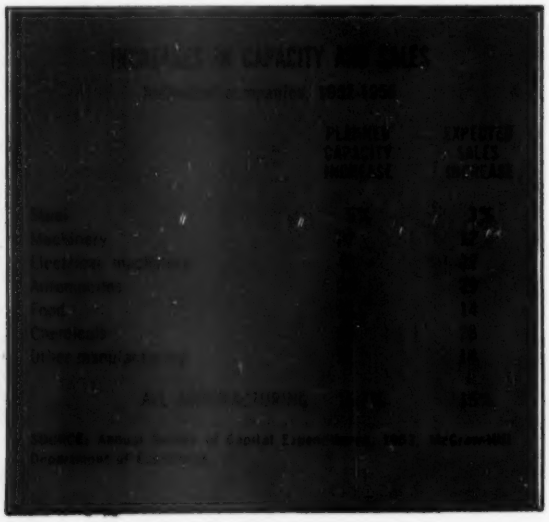
What is different is the equipment. In the newer plant—it's almost entirely automatic—even to the extent of handling a complicated product mix.

Result: The newer plant is turning out 300% as many units per man-hour as the older one—twice the number of units with 60% as many men. And it's a higher-quality product.

In this case, the "old" plant was competitive with the rest of the industry. It's still operating in a booming market. But, if selling gets hard in this industry, the company could pull its operations entirely into the newer plant—and base prices on that plant's costs. What would competitors do then—if they hadn't already built new-type plants?

Does this suggest that some companies are planning ahead to retirement of some of their present capacity? There's some evidence to this effect in the McGraw-Hill survey. The same companies that expect to increase their sales by 15% expect to increase their capacity by 16.7%. To take the extreme example, look at the electrical machinery industry: The same companies that expect a 22% sales rise plan a 40% capacity rise. (See table below.)

If this is an indication of a deliberate and careful plan to retire some of the least efficient capacity in the industry, it makes all kinds of sense. The result would be to increase efficiency and lower costs, thereby improving the prospects for low prices, better wages, and better profits.



There *could* be another explanation for the difference between expected sales increases and planned capacity increases. Some thoughtful economists believe that companies are kidding themselves about their ability to expand their sales, and are planning expansion on that basis. In other words, this argument goes, the "expansion planners" are going on the assumption that, because most sales forecasts have been proved low in recent years, the forecasts ahead to 1956 will also prove to be low.

Economists who are critical of such thinking generally point to the fact that, by the end of 1953, capacity of the manufacturing industries will be 118% above the level of 1939. That, they say, is dangerously high if we should have even a moderate drop in demand. And plans for the next four years tend to increase the danger. (See chart and table at right.)

Simply to cite a figure like 118%, however, may also be deceiving. Like everything else, it has to be related to a given situation before it becomes really meaningful. You may have heard people say the new automobiles have engines that are too powerful. It's true enough that the 210-hp. motor in a Cadillac *can* move the car a lot faster than is safe (or legal). But if the driver uses a bit of common sense, he can cruise not only safely but also efficiently, and still have a good reserve of power for emergency use if needed.

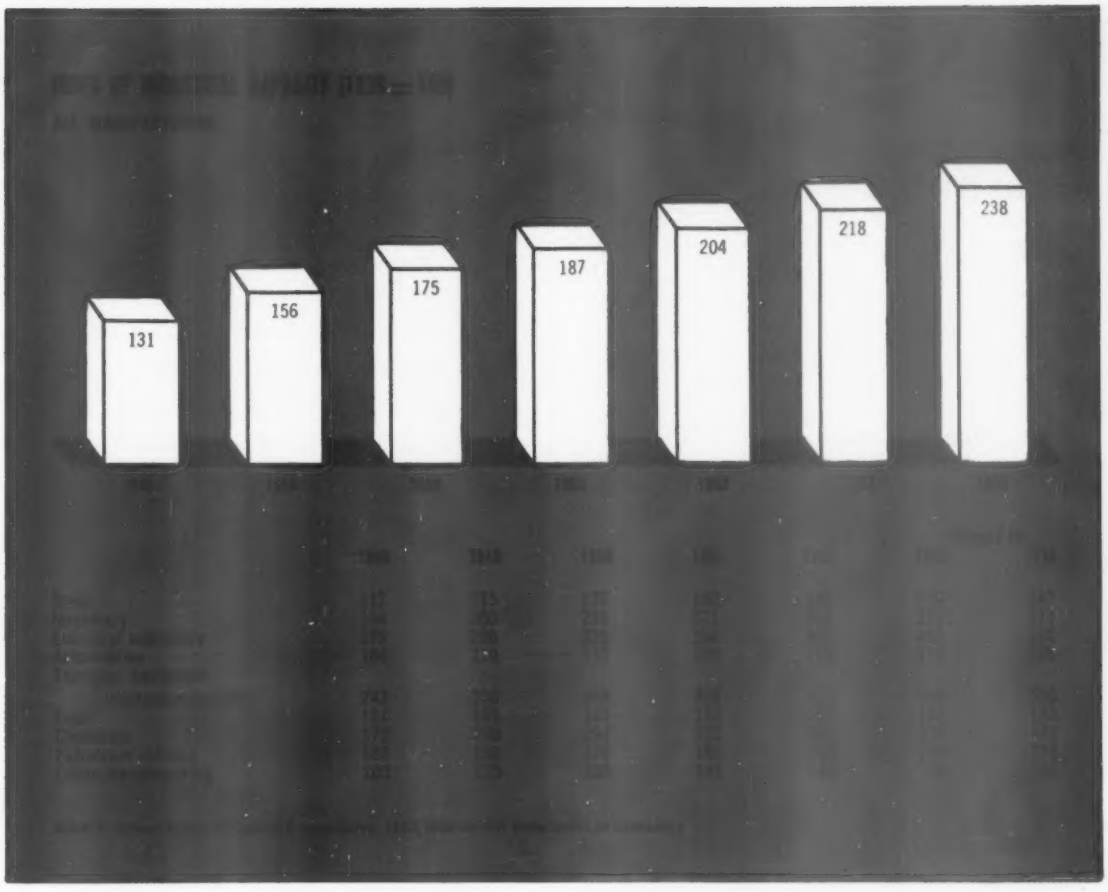
So, when you talk about capacity at 118% above 1939, it's necessary to say that it is capacity currently being used, or at least being actively maintained and ready for almost immediate use. It represents hours-per-week utilization of equipment based on currently scheduled operations—roughly the present situation in most industries.

If all-out war should come, we could make our production far exceed our "capacity" of 118% above 1939. Assuming availability of men and materials for the extra shifts and extra days, we could outproduce our "capacity" by one-half or more.

But if you are expecting a period of increased competition—as most people are—then you have to take some other factors into account when talking about capacity.

These factors are:

1. **Part of our present capacity is economically inefficient, and some of it is actually obsolete.** The amount that is "competitively" inefficient varies widely from industry to industry. Existing capacity—if not modernized—becomes more inefficient with each passing year. New technological developments are coming faster all the time, thus tending to increase the obsolescence rate of existing equipment.
2. **Our population has increased 23% since 1939, and will increase another 15% in the next**



decade. Population changes, of course, have more effect on capacity requirements in some industries than in others. But over the long pull, more population necessarily means more demand and need for more capacity.

3. **A substantial military production program has become a semi-permanent feature of our economy.** Today, around 15% of our capacity is being used for military production. Barring the hoped-for miracle of a permanent peace settlement of the cold war, there's little chance the figure will fall below 8% or 10% for the next decade.

Just how much relative importance you attach to these three factors will be determined largely by the situation in your particular industry, and by the financial and technological condition of your company.

There's another thing to remember: Shifts in consumer preference affect your capacity situation. But don't misinterpret changes in consumer preference.

Some companies, and sometimes whole industries, get "sick" because consumers transfer their demand from one brand or even type of product to another. This creates "excess" capacity for a company or industry, to be sure. But it's not the kind of excess capacity that brings trouble to the economy generally. Because the consumer is still spending as many dollars. How it might affect you, will depend on your particular relationship to the company or industry involved.

Of course, the real question is:

How do you make sure your company isn't the one the consumer shifts his preference away from?

Good marketing, advertising, the proper channels of distribution, all play their part. But they can't do much for you **unless you have kept your costs in line with or below your competitor's.**

That doesn't say that because your competitor's cost is $1, yours can't be $1.25. But if it is, you've got to be able to persuade the consumer that you're delivering an extra quarter's worth of quality.

One trouble has been that, since the war, "excess demand" has made it possible to sell almost without price-and-quality competition. So the market place has not given manufacturers any real yardstick to measure how well they have been doing in relation to competitors—or what they can expect if the going gets rough. *Turn the page*

Begins on page 62

A Measure of Competitive Production Efficiency

Studies of units of output per man-hour made by the Bureau of Labor Statistics suggest a possible yardstick that you may be able to use. BLS studied only industries with a relatively "constant product," to insure reasonable accuracy of final figures. And there are not enough industries represented for an "all-industry" average to be meaningful.

If you happen to be in one of the industries studied by BLS, you'll find a real challenge—and quite possibly a real opportunity—in the figures. If you're not in the group of BLS industries, you can find the same challenges and opportunities by estimating the figures for your own and similar industries.

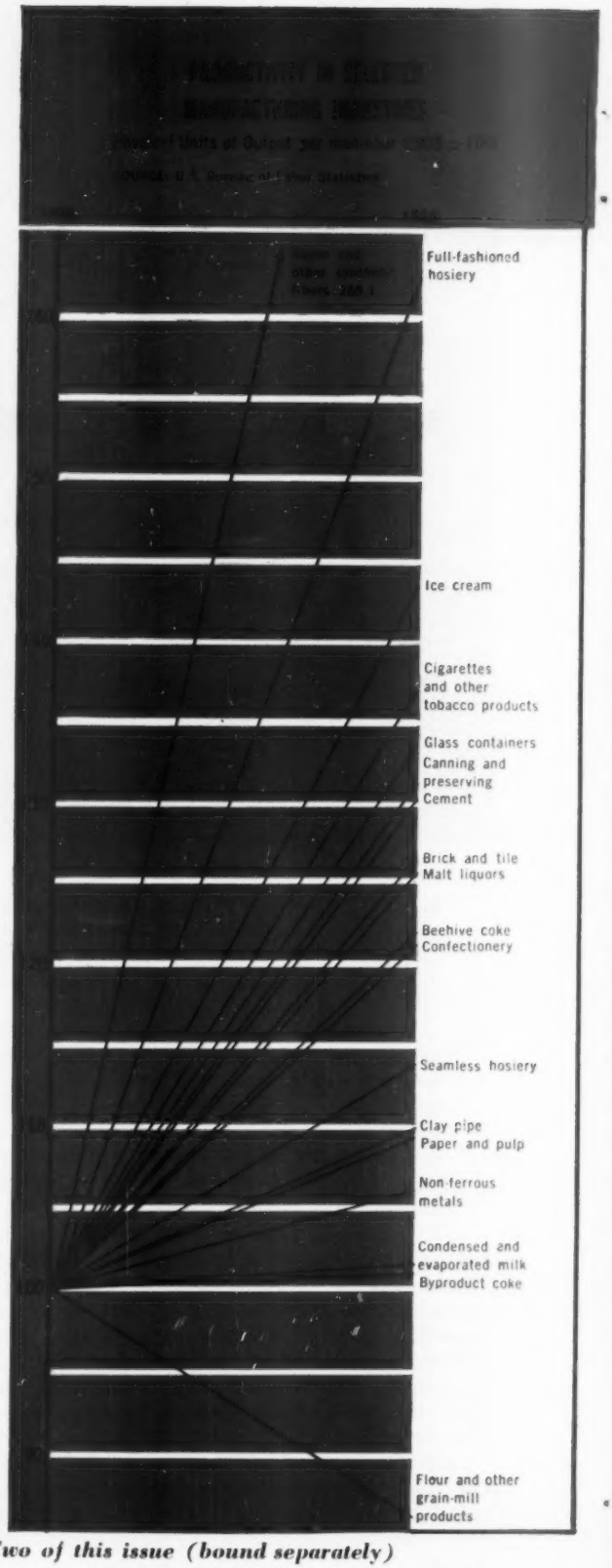
THE OPPORTUNITIES • If the average productivity of an industry has increased *X*%, its almost a certainty that some companies in the industry have increased far more than that. So the average increases can be taken as a *minimum* reliable goal—based on present technology—for every company in the industry.

And if the rayon and synthetic fiber industry can increase its productivity by 186% in 11 years (or 10% a year for 11 years hand running), then similar increases are certainly within the realm of possibility for other industries. Obviously, new and improved technology will be necessary to do this in most cases.

As a possible example of how improved technology may bring dramatic productivity increases, keep your eye on the tanning industry. Secotan, Inc., of Somerville, Mass., has announced a new process for tanning leather that cuts process time from several weeks to 5 or 10 minutes. If it proves to be as good as it sounds, it may bring a major revolution in the tanning field.

THE CHALLENGE • If a company has not increased its productivity at least as much as the industry average, it is going to be squeezed, *and squeezed hard,* when competition stiffens.

And until a company has matched the increase of the leader in the industry, it remains vulnerable to any competitor who suddenly decides to "copy the leader" and adopt the best of the present technology in the industry. Actually, anyone who adopts *all* of the best technology would surpass the performance of the leader, because it's a 100-to-1 shot even the leader doesn't have *all* of the best technology. That's why even the leaders have to keep improving all the time.



For a guide to BETTER PLANTS, see Part Two of this issue (bound separately)

LOCATION OF INJURIES	DEPARTMENT NUMBER														
	4's	6	4	24a	24b	25a	31	33	37	50	51	52	OFF	TOTAL
Eye (s)	1	2								2	6	2		25
Head, n.e.c.											1	1		6
Throat														
Chest (lungs)											1			1
Back	1					1						1		7
Arm (s)											11	1		19
Hand (s)						2				1	4			16
Finger (s)	1									3	38	7	1	98
Leg (s)		1									1			9
Foot or Feet		2								1		1		5
Toe (s)		1												1
Abdomen														2
Not elsewhere classified														
TOTAL	3		2			3				7	62	13	1	189

DANGER SIGNAL: BETTER DO SOMETHING ABOUT THOSE 38 FINGER INJURIES, RECORD WARNS.

Stopping Little Injuries Stops Big Ones

MOST OF THE INJURIES in any plant are minor injuries—like those reported in the table above. This table shows part of the actual record of one month's injury experience at Otis Elevator Company's Harrison, N. J., plant.

Otis doesn't compile records like these every month just for the exercise. The company puts the results to work. It uses minor injuries as "accident bloodhounds"—pointing the way to danger areas in the plant. Using its knowledge of minor injuries in this way enables Otis to prevent major injuries (lost-time accidents) from occurring.

DOES IT WORK? Best way to find out is to look at the record. Here it is:

In 1949, when Otis started its minor-injury follow-up, the lost-time injury frequency rate (number of lost-time injuries per million man-hours worked) was 16.9. At the end of 1952, the rate was 0.69. In other words, the average interval between lost-time injuries in 1952 was about 1.5-million man-hours! That's a remarkable record in any industry—in heavy metal-working, it's phenomenal.

HOW DO THEY DO IT? Best answer comes from local plant executives. And the first thing they point out is that you can't give all the credit to any one thing. Otis carries on an unusually complete safety program, under the guidance of a full-time safety director. This includes good indoctrination of new workers, organized inspection procedures, safety committees, contests, and many other educational and promotional activities. As in all good programs, "everybody gets into the act."

Result is, you can't say that Otis's method of putting its injury records to work is responsible for what has happened in the past three years. But this one thing is certain:

The way Otis uses minor injury records has been one of the big guns in its safety program. Without that essential ingredient, chances are the results so far achieved would not have been so good.

Basic records used in the program include more than just the one shown above. In line with standard practice, injuries are classified by departments in four other ways—unsafe acts, unsafe conditions, accident type, and nature of injuries.

Turn page to see what Otis Elevator does about its safety danger signals ▶

How Otis Elevator Puts Injury Records to Work ... *Begins on page 67*

1 Everything starts with the Medical Bureau. John Bobrowski, turret lathe operator, hurt finger, gets accident investigation report from Nurse Catherine Dougherty, takes report form for his foreman.

2 Nurse takes carbons of accident reports to Safety Engineer D. A. Petryzyn. She also keeps one copy in her files. Here she mentions Bobrowski's injured finger, since his department's record is poor.

4 Foreman Cochrane decides to discuss Bobrowski's case with the safety engineer. True, it's only a minor injury. But, like the nurse, Cochrane recalls that this is one of a whole parade of finger injuries he's been seeing for the past month or so. Safety Engineer Petryzyn has been looking at the regular monthly report, just out. It shows total of 38 finger injuries for Cochrane's department—all minor.

3 "Here's how it happened," says Bobrowski to Foreman Andrew Cochrane. Cochrane's immediate job—even though the injury is a minor one—is to look into it in detail, see how similar injuries can be prevented in future. Note accident investigation form in Cochrane's hand. He must fill it out and return it to safety engineer. Foreman cooperation in investigating accidents is 100%—a big asset.

5 Safety engineer and foreman end up right back in the department. That's where you find out what's wrong, they agree. They check every finger injury, decide on several specific steps Cochrane will take.

6 Pay-off comes the next month. Safety Engineer Petryzyn points to Cochrane's finger injury record. It's already better. And, since they're working on it constantly, they feel they have problem licked.

WORK SAMPLING DATA SHEET

DATE	TIME	OBSERVATION		SUMMARY			TYPE OF HANDLING				TYPE OF CONTAINER						REMARKS
		Run	Idle	Run	Total	%	Load	Un-load	Carry Load	Carry Empty	Bucket	Skid Bin	Pallet	Chain Sling	Sheet and Coil	Misc.	
6-22	7⁰⁵	III	卌 II	3	10	30	10	8		7		10	8				
	7⁴⁰	IIII	卌 I	7	20	35	14-15		9	12	14		9		15		
	8²⁰	卌 II	III	14	30	47	11	12-9	14-15	7-8		11-9	14-15	12			
	8³⁶	卌	卌	19	40	48	12	6	15	11-10		12		6		15	
	8⁵⁵	III	卌 II	22	50	44	14	12	10			14-12	10				
	9³⁵	卌 II	III	29	60	48	15-6	10-8	11-15	12	15-10	15-8	11-6				
	9⁵⁰	IIII	卌 I	33	70	47	14	15	7	6	14		15		7		
	10¹⁰	II	卌 III	35	80	44	11-10			11	10	11					
							← INDICATED BY BAY NO. →										

RANDOM OBSERVATIONS taken to analyze crane movements at Lincoln Electric Company show which of 10 cranes were running, which were idle, phase of handling cycle engaged in, kind of container used, and bay where activity took place.

WORK SAMPLING:

Fast Way to Get Facts on Handling

By WAYLAND P. SMITH • Instructor in Industrial Engineering, Case Institute of Technology, Cleveland

Mr. Smith teaches approximately nine months a year, works in industry during the summer months. He writes: "Since industry buys Case's 'end-products,' I find this interchange of jobs very helpful."

In this article Author Smith describes how one of his part-time employers—Lincoln Electric Company—took advantage of the time-saving feature of work sampling. This technique developed the facts needed to plan improvements in crane service to production operations.

HOW TO IMPROVE CRANE SERVICE? A familiar problem. Probably every plant that owns a crane has to face it at some time or other. Sometimes the solution is simple. This time it wouldn't have been —if we hadn't used work sampling to provide the facts on which to base it.

Here's the situation: Ten overhead cranes service production and assembly in nine bays of the Machine Division, The Lincoln Electric Company, Cleveland. They are linked by a transfer bridge that runs the full width of the plant—perpendicular to the bays.

It's a complex system, with several potential trouble spots.

To improve crane service, management first had to have the facts. It had to know what factors were

causing delays, and to what extent each was responsible for time lost.

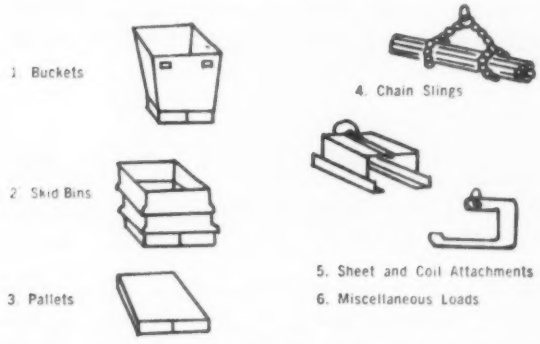
Conventional time studies were out of the question. They would take too long and cost too much. Work Sampling (FACTORY, July 1952, p. 83) gave management the facts it needed to solve the problem, to attack the critical points. Time and cost? One month, and 25 man-hours.

How We Got the Facts

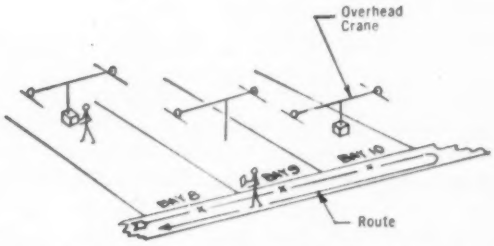
First we set up the elements of crane operation on which we believed we needed the relative time. They are:

1. **Loading**—lowering the crane attachment to the unit to be moved, securing the load, and picking it up to move it.
2. **Carrying loaded**—in transit with a load.
3. **Unloading**—lowering the load at its destination, releasing it, and lifting the attachment to clear the load.
4. **Carrying empty**—crane in transit empty.
5. **Idle time.**

We wanted to know, too, the types of loads moved by each crane. So we set up six classifications:



Next step was to select the route to be followed by the observer, and the points at which he would make his observations of each individual crane's activity. Here's the way we did that:



We scheduled 20 observations of each of the ten cranes per day. However, and this is important, the observations were made at random times. The intervals between observations varied.

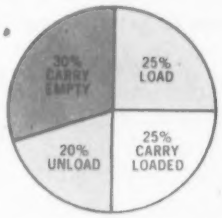
The sample data sheet on the opposite page shows how we recorded the observations.

How We Presented the Facts

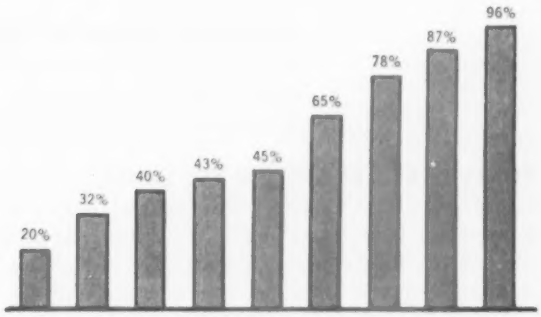
One thing about a work sampling study: *It's easy to summarize.* We kept a running total of operating and idle observations, percentage of operating time, and activity in individual bays. We quit when the percentages stabilized because we felt the data were plenty good enough to see the handling problems.

We translated the summary data into charts for operating management analysis.

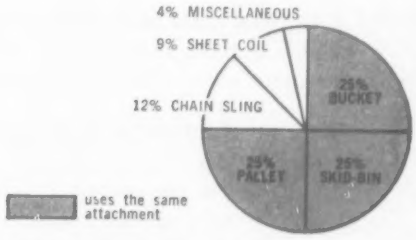
AVERAGE UTILIZATION of cranes was only 53%.



OPERATING TIME was divided as shown.



PERCENTAGE OF OPERATING TIME spread from a minimum of 20% to a maximum of 96%. The figures represent the relative amount of handling in each bay because the transfer bridge permits the cranes to move from bay to bay.



ONE ATTACHMENT handled 75% of the loads, according to this chart. These data gave management a picture of savings opportunities in redesigning attachments.

Management found the data accurate enough and in sufficient detail to discuss and plan improvements in handling in this division. It had the facts, supplied quickly by work sampling.

IDEAS OF THE MONTH *for*

By LEWIS K. URQUHART • Managing Editor, FACTORY

DESIGNER'S DREAM ON WHEELS is coming to the Materials Handling Show in Philadelphia, May 18-22. Admittedly taking the idea from the auto people with their "LeSabre" and XP-300, Clark Equipment Co. will exhibit its X-70. Tagged the "fork truck of the future," it will incorporate many radical ideas to get customer reaction. Not for sale, but well worth a look-see.

DRY INK FOR FOUNTAIN PENS so concentrated that a single filling will last 100 years was predicted for the year 2000 (on April Fool's day) by R. D. House, executive v.p. of Waterman Pen Co. Said the ink would draw moisture from the air at the instant of writing. Makes all kinds of sense to our Buck Rogers Department.

IS YOUR VISE SQUAD LIMITED by its ability to position work properly? Flexivise provides for 360-deg. rotation of vise-held work on extendable arm, in addition to swivel base. Flexivise Co., 1149 East Pico Blvd., Los Angeles.

TYPE TWO FORMS AT ONCE with new "dual feed" arrangement for moving side-punched continuous forms through most business machines and electric typewriters. For example, you can print pay checks and make ledger entries at the same time. Standard Register Co., Dayton 1, Ohio.

BOXES THAT ARE STRONG YET LIGHT are the result of laminating Kraft containerboard and a veneer-thin (about ⅛-in.) sheet of Douglas fir. Like wood, Ply-veneer is stiff and resists crushing. The containerboard gives it toughness, impact resistance, light weight, and a surface that is easy to print on. Production starts in June. Weyerhaeuser Timber Co., Tacoma 1, Wash.

ELECTRONIC PHOTOSTATING is an oversimplified description of xerography, a new, fast way of duplicating letters, documents, records, etc. Avoids messy chemicals and inks associated with stat or offset reproduction. Takes only 3 minutes to make first copy; you can run 5000 from the master. Annual rental for the equipment is $720. Haloid Co., Rochester, N. Y.

HANDIEST CALCULATING MACHINE we've seen is cylindrical in shape, small enough to be held in palm of one hand. Adds, subtracts, multiplies, divides, and extracts square roots. Curta Pacific Co., 420 Market St., San Francisco 11.

SLIDEFILM AND MANUAL are the main items in a $25 package of information about industrial power distribution. It's a soup-to-nuts treatment, from 106 non-technical sound-color slides to case histories, an "idea book," and technical product information. From any apparatus office of General Electric Co.

TO HELP YOUR EMPLOYEES UNDERSTAND the excess profits tax, give 'em an easy-to-read, 12-page booklet, "How the Excess Profits Tax Hurts *You*." Good Reading Rack Service, 76 Ninth Ave., New York 11.

HONEYCOMB BLUEPRINT FILE holds 49 neatly rolled prints in a 14x14-in. corrugated board container (length 31 to 55 inches, for various size prints). Roll & File Systems, Inc., P.O. Box 85, Ferndale 20, Mich.

Factory Executives

RAPID EXECUTIVE TURNOVER makes new Coffield "interchangeable" organization chart a *must* for some companies. But anyone'll find advantages in being able to change lines, boxes, names right on wall chart. Make copies photographically, without drafting time. Management Charts Control Co., 1731 N. Wells, Chicago 14.

"PACKAGED SOLUTION" TO PACKAGING problems may be combination of Spot-Seal and Auto-Pak. Spot-Seal is a material that sticks only to itself, forms dust-proof, water-repellent coat wrap without need for fasteners. It's made by Sherman Paper Products Corp., Newton Upper Falls, Mass. Auto-Pak places two sheets of heat-sealing material around products, seals, cuts off, and delivers 40 finished packages a minute (faster with automatic feed). Pak-Rapid, Inc., 530 North 21st St., Philadelphia 30.

EIGHT NEW SAFETY POSTERS aimed at promoting better industrial truck operation can be had free by writing to Baker-Raulang Co., 1320 West 80th St., Cleveland 2.

LIFT TRUCK IN THE OFFICE provides access to files all the way to ceiling. Actually, it's a chair-and-desk mounted on wheeled lift. Clerk works comfortably from sitting position. Designed for use with high-tiered Rotor Corres-File, but seems to us it could be used with any type of file set-up. The Wassell Organization, Inc., Westport, Conn.

PICTURE-IN-A-MINUTE CAMERA (the Polaroid Land Camera) can be used to make complete employee or visitor identification badges in less than 6 minutes. Whole story on how to do it, together with plenty of worthwhile tips on plant security in free, 36-page booklet, "Industrial Security." Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, N. Y.

OPEN HOUSE AT A "DEFENSE" PLANT is next to impossible when you're doing a lot of classified work. General Electric got around it by moving a full-sized production line of non-classified work from its Gas Turbine Division into Cincinnati Garden, held open house there as a "Jet Builder's Fair."

COMPANY 'COPTER is solving executive transportation problem for Rockwell Manufacturing Co., Pittsburgh. Its seven plants are within 200 miles, yet not convenient to regular airfields. The 7-passenger S-55 Sikorsky helicopter puts down in heliports right on regular company parking lots.

THE DISC JOCKEY PROBLEM may be solved for plants that want continuous music. You can now buy a magnetic tape recorder-player that plays for eight solid hours without repeating. A high-fidelity version (full 15,000-cycle range) plays four hours. Ampex Electric Corp., Redwood City, Calif.

FORK TRUCK OF THE MONTH is called the Reach-Fork. Accordion-type fork holder pushes the forks forward in a real boarding-house reach—24 inches from "normal" position. More details, page 116. The Raymond Corp., Greene, N. Y. See it at the Materials Handling Show.

SUPERVISORS' CHECK LIST

Note to Supervisors: Below you will see a list of topics which may be of interest to you. Place a check beside the topics which would mean the most to you in your present position. Check as many as you wish.

1. ✓ Duties and responsibilities of supervisors
2. ___ Principles of industrial organization
3. ✓ Company organization and the supervisor's place in it
4. ___ Broader aspects of the supervisor's job
5. ___ Correct use of forms and reports
6. ___ Federal laws affecting supervisors
7. ✓ Company organization, history, markets, etc.
8. ✓ Company policies and plans
9. ___ Product training
10. ___ Plant rules and regulations
11. ✓ Personnel services (leaves, vacations, promotions, etc.)
12. ___ Company services (housing, laundry, cafeteria, etc.)
13. ___ Service departments (purchasing, employment, engineering, safety, etc.)
14. ✓ Principles of effective leadership
15. ✓ Building production incentives
16. ___ Helping new workers
17. ✓ Giving orders and directives
18. ✓ Correcting and improving subordinates
19. ✓ Building initiative and confidence
20. ___ Handling discontented workers
21. ✓ Reducing absenteeism and labor turnover
22. ___ Maintaining discipline
23. ✓ Increasing cooperation
24. ✓ Placing the right worker in the right job
25. ___ Waste prevention
26. ___ Basic science and mathematics
27. ___ Special technical training (textiles, chemistry, etc.)
28. ___ Quality control
29. ___ Trade training
30. ✓ Keeping costs down
31. ✓ Job evaluation
32. ___ Improving methods
33. ___ Time and motion study
34. ✓ Production control and planning
35. ✓ Labor legislation
36. ___ Industrial inspection
37. ___ Safety and accident prevention
38. ___ Training new workers
39. ___ Conference leadership
40. ___ The care of materials and equipment
41. ___ Developing understudies
42. ✓ Getting more from your day
43. ___ How to use these conference ideas
44. ✓ Rating your own performance
45. ___ Other (specify): _____

Name John Doe

Useful survey form lets men speak for themselves, offers...

Short Cut to Foremen's Training Needs

By WENDELL M. PATTON, Senior Associate, Bruce Payne & Associates, Inc., Westport, Conn.

IT'S EASY TO SAY, "Let's have a supervisory training program." But it's not so easy to decide just what the program ought to include.

The reason: It's costly and time-consuming to make a formal survey of training needs. And higher management levels are often impatient to get going.

That's why a short-cut method of surveying the training needs of supervisors should have real value for many plants. But to be useful, the short-cut must also be reasonably accurate.

Fortunately, some recent research at Purdue University suggests that there *is* a simple short-cut method that shows consistently reliable results. The check list shown here is an example.

One important point: While a simple check list has definite value for plant use, it certainly isn't the final or perfect answer to spotting training needs. It will not replace longer and more comprehensive methods of determining training content. *But it does supplement them. And many times it will fill in when the other procedures for some reason can't be used.*

How the Survey Was Developed

Here's the story of how the list shown here was developed in one plant. It started as a much larger list, covering practically every topic that might indicate an area of training need. This was done by analyzing the supervisory jobs, surveying previous research and writings, examining various

CHECK LIST of most commonly needed types of training gives foremen chance to tell company what they want. Average number of topics was 19, as in this sample. After completing check, men are asked to go through again, circling five most preferred topics, and crossing out five that are least preferred.

current training programs, and asking for suggestions from foremen and operating executives.

The list was cut to about 100 items by removing duplications, overlaps, and the like. We then asked a panel of psychologists, executives, and foremen to analyze all items and come up with the final list. Each final item was kept on the grounds that it was of key interest and value to the foremen.

Actually, the list covers five basic areas of training: (1) administration, (2) orientation, (3) human relations, (4) technical, (5) general.

How the Survey Was Conducted

When the check list was finished, we asked all foremen and supervisors to fill it out:

1. We had them check the types of training they felt would be most beneficial to them if they could get them. There was no limit on the number of items they could check.

2. We followed up with oral instructions after the first step was completed. Each man was asked to draw a circle around the five items already checked that he thought were the most important. He was also asked to draw a line through the five least important items. This resulted in a measure of the *importance* attached to different topics, and the frequency of mention of each.

How the Foremen Voted

Here is the score for the different areas of training covered:

TRAINING AREA	PER CENT OF TOPICS DESIRED
Administrative	**68%**
Orientation	**31**
Human Relations	**91**
Technical	**46**
General	**29**

HUMAN RELATIONS • It was clear that the supervisors wanted human relations training more than anything else. This conforms to the findings in other plants using more elaborate survey methods. As a further check on the supervisors' need for this kind of training, the questionnaire *How Supervise?* by Remmers and File was given. This is a test of knowledge of methods of leadership and supervision.

The results showed clearly that the supervisors not only wanted human relations training but also needed it! The mean score on this test was 29.11, which according to the test norms is exceeded by about 65% of the supervisors taking this test. In other words, the supervisors in this plant were below average in this phase of their knowledge and wanted training in it. Evidently, they knew they needed it and were capable of stating their needs without elaborate testing and job analyses.

ADMINISTRATIVE TRAINING • The desire for administrative training also appeared interesting when studied from the standpoint of company policies and philosophy. There had been little structuring of the supervisor's position, which had resulted in confusion as to just what was expected of him. It was difficult for him to determine his own status, responsibility, and authority. Actually an entirely different *functional* structure existed from the official *organization plan* of the plant. Understanding this situation makes the supervisors' desire for such topics as duties and responsibilities, place in organization, and broader aspects of the job have real meaning to far-sighted management.

TECHNICAL TRAINING • Since almost every supervisor represented a different technical interest and competence, it was not possible to obtain an objective comparable measure. Seemingly, this status of technical training is fairly accurate because in this plant all except four supervisors had been promoted to their present supervisory position because of technical competency rather than leadership ability. The fact that technical training even ranked as high as third place was due to considerable interest being shown in topics related to job study and methods improvement.

ORIENTATION TRAINING • This consisted of such areas as company plans and policies, plant rules and regulations, company services, etc. It was rated in fourth place. Miscellaneous and other types of training ranked last. The supervisors apparently felt little need of training in these areas.

MOST POPULAR AREAS • Of the 44 items, ten were checked by 75% or more of the supervisors—items 1, 3, 14, 17, 21, 23, 24, 30, 31, 35.

Wide individual differences occured in the number of training items checked by supervisors. Some checked over 90% of the items, others checked none. The average number checked was 19.

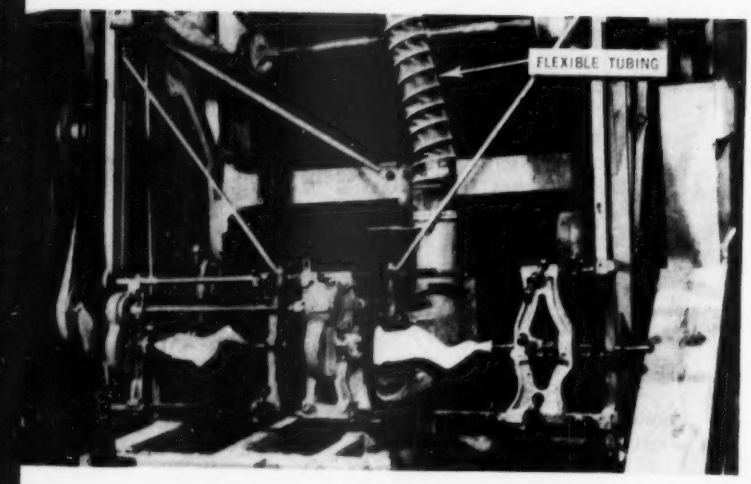
The best supervisors apparently felt the need for training to a greater extent than the poor ones. *The evidence*: The group of supervisors rated by management as the best checked an average of 32 items, compared with the average of 7 checked by the group rated worst. Those who needed the training the most, desired it the least!

* * *

This case, as well as others in other plants, has shown us that supervisors know what their weaknesses are and what training they need most.

The education of foremen and supervisors can actually be dangerous — if not preceded by a thorough analysis of the situation, and if not recognized as only a part of a larger program. This simple technique can be used to help avoid these dangers—also to help develop a workable training program that will deliver the goods.

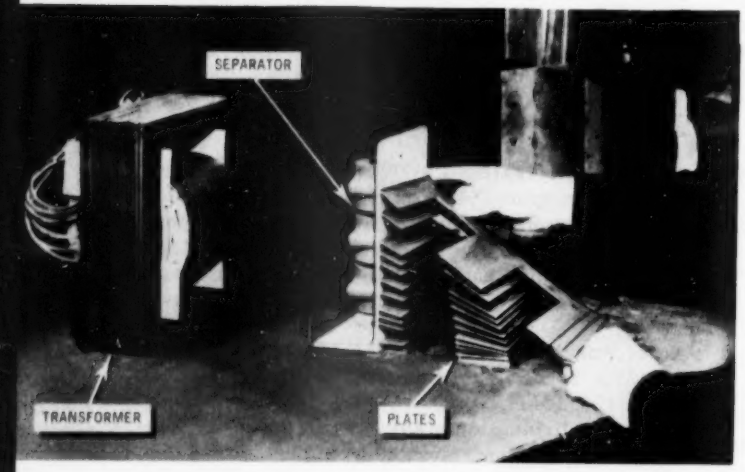
OPERATING SHORTS



Fabric Intakes for Vacuum System

Replacing metal intake duct with flexible tubing has improved a vacuum system which draws sawdust and wood chips from lathes at Sterling Last Corporation, New York.

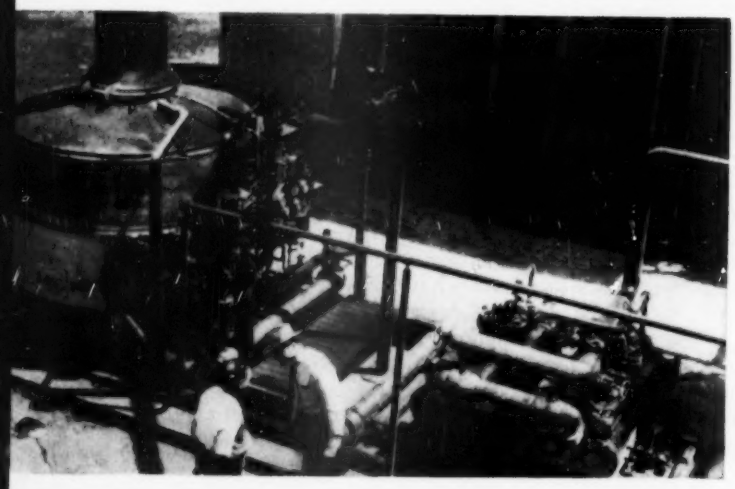
Each vacuum intake is attached to and moves with a lathe carriage, which travels along a hardwood block being shaped into a shoe last. With the rigid metal duct, this movement was permitted by a universal joint, which leaked and was noisy. The 4-in. Neoprene-coated fabric tubing (Spiratube R-10) needs no joint—has stopped leakage and reduced noise by 80%.



Separator Aids Steel-Plate Handling

Use of a separator in handling greased steel plates during the laminating stage of transformer production has boosted output by 40% at Sorensen Company, Stamford, Conn. Formerly plate handling was slow because the plates tended to stick together. Now the separator (Basco Manufacturing Company) raises the plates equidistantly. The operator can easily grasp one or more at a time.

Separation is based on the fact that magnetically similar poles repel. By inducing a magnetic field in the stacked steel laminations, the individual plates repel each other, causing their ends to fan out.



Rented Steam Voids Output Delay

General Tire & Rubber's Baytown, Tex., plant has three conventional, high-pressure steam boilers, each generating 27,000 pounds an hour. One broke down, needed at least two months for complete overhauling.

To fill the gap, a Vapor-Clarkson package generator was rented from Texsteam Corporation, Houston, and rushed to the plant on a single truck. It was placed on a concrete base—laid overnight—and cut into operation in a few hours. The automatic, gas-fueled unit produces 22,000 pounds an hour at 300 psi. It's one-fifth the size of a conventional boiler. The Baytown people liked the rented unit so well they bought it.

Substitute Jigs Speed Assembly

Substitute jigs holding duplicate assemblies insure uninterrupted operations on a hearing-aid assembly belt at Sonotone Corporation's White Plains, N. Y., plant.

There's a substitute jig, numbered accordingly, for every position on the belt. Each contains an assembly, completed for that position. If an operator must leave her position, her relief replaces the jig she has been working on with the proper substitute jig, so work isn't held up. The replaced jig is brought up to specifications later for use as a substitute. Photo shows substitute jigs for one position.

Fork Trucks Made Fume-Free

Four gasoline-powered fork trucks operate safely in an unventilated basement storage area (12,000 square feet, 9-ft. ceiling) at Land O'Lakes Creameries, Inc., Minneapolis.

Each is equipped with an OCM catalytic exhaust system (arrow), which burns noxious truck exhaust to harmless carbon dioxide and water vapor.

Before attachment of the catalytic mufflers, carbon monoxide and hydrocarbon exhaust vapors proved harmful to operators and to foodstuffs processed in the plant.

Atom Helps Spot Message Jams

Radioactive cobalt has practically wiped out delays in locating failures in an 8000-ft. pneumatic tube message system at The Carborundum Company, Niagara Falls, N. Y.

Finding a tube jam often took hours until each metal mail carrier was tagged with cobalt. Now a stoppage can be spotted fast by checking the length of tube with a Geiger counter.

To apply the cobalt, absorbent paper disks are dipped in a solution of soluble cobalt and water, then sandwiched between two pieces of plastic. The radioactive disks are hermetically sealed in carriers. There's no more health hazard than in a luminous watch dial.

7 Keys to Cleanliness

By ARTHUR D. BUSCHMANN • Plant Engineer, Ivanhoe Plant, Perfection Stove Company, Cleveland

Treble the size of its sanitation crew because there was three times as much cleaning to do? Not Perfection Stove. It studied costs instead, and came up with techniques to do the job with only a 40% increase in manpower.

"LET ME SEE YOUR WASHROOMS and locker rooms," a sanitation expert once said, "and I'll tell you how good your whole plant housekeeping is."

As I think this over, I believe he's right. At any rate, he's right as far as our plant goes. It is recognized as one of the neatest and cleanest in the area. And our washrooms are "just like home."

Our management wants it that way. It knows that clean worker facilities encourage clean work, and healthier and happier workers. But it also wants this important job of plant sanitation done at lowest cost.

The bill for plant cleanliness can run up to a major expense. If you doubt it, just make a quick check on the annual cost of single items like soap or toilet tissue. And then add on the labor cost.

We made that approach when we recently increased our productive floor area from 290,000 to 782,000 square feet—a jump of 170%. On that basis our existing janitor force of 13 men would have to be enlarged to 35 men.

But it wasn't. We now clean over 2½ times the old area, three times as many locker rooms and toilets, more stairs, elevators, offices, loading docks, and drinking fountains with 17 night men and 1 day man—an increase of only 40% in manpower!

Here are the ways in which it was done—we call them the seven keys to plant cleanliness.

1 Design Facilities for Easy Housekeeping

Best time to save housekeeping dollars is while the plant is still on the drawing board. It is here that you can weigh the advantages of tile walls, terrazzo floors, chrome piping, centralized locker facilities, and wall-mounted toilets. You can look over the benefits of good lighting, pleasant and practical paint colors, efficient waste disposal and scrap collection, and a host of other ideas, to determine the ones most likely to save you money.

Our management saw the advantages of these modern facilities, and was willing to pay for them. We also remodeled some existing facilities to suit.

Our new locker and toilet rooms are designed for maximum cleanliness with a minimum of maintenance. Dirt-catching ledges are eliminated. Locker tops are sloped to prevent the accumulation of debris. A daily once-over with the broom, mop, or scrubbing machine is all you need.

2 Provide Adequate Janitor Facilities

Proper equipment and adequate facilities are essential for efficient housekeeping. How much time does your janitor waste getting his supplies? How easy do you make it for him to draw or drain water?

At Perfection we spotted storage closets with service sinks in convenient locations to provide a handy source of supplies and cleaning aids. In this closet we placed the janitor's sink at floor level to make it easy to dump water. The water outlet was located high enough to permit easy filling of scrubbing machines, has a hose extension and pail hook.

3 Establish "Off-Hour" Cleaning

It's almost impossible to clean efficiently in a busy production area. Everybody who has tried it knows the difficulties. You can't get under or around equipment. The aisles are blocked. And there's general confusion.

We found that nighttime cleaning boosted our janitors' efficiency 25%. It eliminated interference and distracting influences.

Our production and office workers like this arrangement better, too. Cleaners don't bother them. They start the day right with a clean workplace. Jobs such as cleaning toilets, urinals, and cuspidors, which are offensive to some employees, are more easily handled during "off" hours.

4 Unify the Janitor Force

Many plants provide janitors for each department who report to the department foreman.

A system such as this can provide satisfactory housekeeping. But it will add 20% to 30% to your bill. It calls for duplication—or even multiplication—of cleaning equipment. It requires each janitor to be a jack-of-all-trades, hence less efficient.

In our case, the work load might be light in one department while at the same time another department needed extra service, and couldn't get it.

Our first move in reorganizing our housekeeping program was to unify the janitor force under the supervision of the night maintenance chief. This has made it possible to train men as specialists in certain phases of the work. For example, the one man who runs the scrubbing machine all the time can double the output of the occasional operator. We can easily shift janitors from area to area when work loads or absenteeism require it.

5 Mechanize the Job

We used to sweep floors with push brooms. Rubbish was hauled to the incinerator in hand trucks. Labor-saving devices were few.

When we unified our force, and put it to work in off-hours, we got to thinking how to utilize this manpower to best advantage. We found the answer in mechanized cleaning aids.

Now, when we clean plant floors, janitors still have to use hand brooms to clean under and around equipment and push the debris into the aisles. But a power sweeper travels up and down the aisles and open areas and picks up the rubbish. It covers 50,000 square feet an hour. We estimate a savings of three men through this equipment alone.

When the sweeper gets loaded to capacity, it is driven onto a dump truck parked in the receiving

docks and emptied. This truck hauls the equivalent of a dozen hand-truck loads to the incinerator on each trip.

The same routine applies in part to a power scrubber which replaced the mop-and-bucket brigade for heavy-duty cleaning. We still use a mop and a dual mop bucket for light touch-up between power-scrubbing jobs.

We also have a wire-wheel floor cleaner to remove grime and dirt incrustations too hard to be picked up by the power sweeper.

We use a large tank-type and a 14½-lb. portable vacuum cleaner to remove dust and dirt from cracks and ledges, and in the office area. A magnetic broom speeds the pickup and salvage of ferrous parts, a job that used to take hours of hand picking. All this power equipment does not only a faster but also a better job than could formerly be done manually.

The janitor's cleaning equipment also has been mobilized. He has a special pushcart for moving cleaning equipment to the job, gathering waste from rubbish cans, and so on. He loads his truck with enough equipment and supplies to eliminate extra trips to the stockroom or equipment locker —quite an item in any large plant.

6 Provide Aids to Good Housekeeping

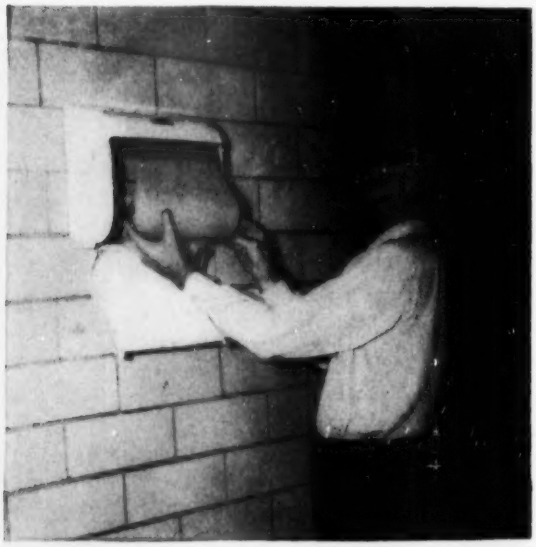
There are many products on the market that speed and ease the janitor's tasks.

Take the nasty job of cleaning cuspidors. Some plants won't use them, and ridicule them as relics of horse-and-buggy days. Well, people haven't changed; they still spit. So we work on the theory that cuspidors localize the job of sanitization. But we have changed to a disposable paper type that saves cleaning, filling, and replacing time. Besides making the servicing job less distasteful, this type saves us $750 a year in labor.

Then there are soaps, detergents, disinfectants, waxes, and so on, that are making our cleaning job easier, faster, and better. We find that most companies selling these supplies are more than willing to demonstrate their products under actual shop conditions. We welcome trials of a few, and pick the "one best" product for each job.

Everyone knows the easiest way to keep rubbish off floors is to get it into a waste can first. It

pays to encourage each employee to do his part in the over-all program. So we have provided plenty of waste containers, painted bright orange.



7 Organize the Work

Any series of operations, to be efficient, will benefit from routinizing and scheduling.

Janitorial work is no different. You start off by determining the cleaning frequency needed, and the best equipment and methods for doing it. Then you can establish time required and work loads.

That is how we found that work distribution was not equal under the "janitor-in-every-department" plan. Once we eliminated inequalities and distributed the load, the general housekeeping improved considerably. Now we can really plan cleaning of stairways, elevator pits, loading docks, etc.

In short, organization of janitorial work has put every job in its proper place in our program, and seen to it that none is overlooked. That's important in a successful housekeeping program, because one dirty smudge on a clean face can spoil the whole show.

What's Indirect Labor Worth?

Here are the newest figures on pay for key indirect jobs, compiled by the Bureau of Labor Statistics, U. S. Department of Labor.

Trend in rates seems upward in cities covered here. Selected jobs show these changes over last year: 1/5th of city job averages up 6%; another fifth up 4% to 5%; and another fifth up 7% to 8%. See nearest regional BLS for more detail.

Also see FACTORY: Dec. '51, p. 108; July '52, p. 126; Aug. '52, p. 91; Oct. '52, p. 145.

• All figures are average straight-time earnings in manufacturing industries except figures in light-face type, which are for *all* industries. They include incentive pay, if any. But they do *not* include overtime or night-shift premium.

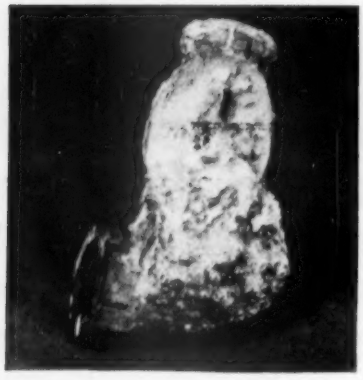
Surveys were not all made at the same time. Date of each survey is shown under the city name.

		BALTIMORE OCTOBER 1952	CLEVELAND OCTOBER 1952	DALLAS AUGUST 1952	DENVER NOVEMBER 1952	KANSAS CITY (MO.) OCTOBER 1952	MINNEAPOLIS-ST. PAUL NOVEMBER 1952	NEWARK-JERSEY CITY NOVEMBER 1952	PHILADELPHIA OCTOBER 1952	PORTLAND (ORE.) SEPTEMBER 1952	PROVIDENCE DECEMBER 1952
MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN		**AVERAGE STRAIGHT-TIME HOURLY EARNINGS**									
Maintenance and Power Plant Jobs	Carpenters, maintenance										
	Electricians, maintenance	1.88	2.10	1.93	1.89	2.02	2.09	2.15	2.03	2.12	1.72
	Engineers, stationary										
	Firemen, stationary boiler	1.54	1.78	1.44	1.64	1.69	1.70	1.73	1.62	1.91	1.46
	Helpers, trades, maintenance										
	Machinists, maintenance	2.06	2.08	1.87	1.89	2.06	2.07	2.08	2.05	2.15	1.76
	Mechanics, automotive (maintenance)										
	Mechanics, maintenance	1.76	2.06	1.77	1.79	1.89	1.93	2.03	1.97	1.98	1.68
	Millwrights			–	–						
	Oilers	1.58	1.77	1.39	1.57	1.57	1.65	1.68	1.52	1.77	1.43
	Painters, maintenance										
	Pipefitters, maintenance	1.92	2.08	–	–	2.12	2.12	2.26	2.10	2.09	1.76
	Sheetmetal workers, maintenance			–	–		–				
	Tool and die makers	1.97	2.26	1.98	2.06	2.23	2.18	2.21	2.14	2.20	1.92
Custodial, Warehousing, and Shipping Jobs	Guards										
	Janitors, porters, and cleaners	1.28	1.50	1.17	1.27	1.39	1.41	1.44	1.32	1.49	1.23
	Janitors, porters, and cleaners (female)										
	Laborers, material handling	1.26	1.61	1.17	1.29	1.47	1.53	1.57	1.48	1.57	1.34
	Order fillers										
	Packers, class A	1.40	1.76	1.22	1.61	1.54	1.61	1.67	1.54	1.64	–
	Packers, class B										
	Packers, class B (female)	1.09	1.35	.82	1.11	1.17	1.19	1.33	1.21	–	.98
	Shipping clerks										
	Shipping and receiving clerks	1.61	1.77	1.59	1.53	1.71	1.62	1.67	1.61	1.87	1.39
	Truck drivers, light (under 1½ tons)										
	Truck drivers, medium (1½ to 4 tons)	1.51	1.77	1.25	1.57	1.69	1.71	1.96	1.70	1.94	1.44
	Truckers, power (fork lift)										
	Truckers, power (other than fork lift)	1.62	1.81	1.38	1.57	1.76	1.52	1.65	1.56	1.96	1.40
	Watchmen										
FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN		**AVERAGE STRAIGHT-TIME WEEKLY EARNINGS**									
Office, Professional and Technical Jobs	Comptometer operators	$53.00	$57.00	$50.00	$54.00	$54.00	$50.00	$55.50	$50.00	$55.00	$44.50
	Draftsmen (male)										
	Draftsmen, junior (male)	55.50	70.00	49.00	69.00	61.50	61.50	66.00	–	73.00	57.00
	Duplicating-machine operators										
	Key-punch operators	51.00	56.50	53.50	53.00	47.00	46.00	52.50	48.50	52.00	43.50
	Nurses (registered)										
	Office girls	36.00	42.50	36.00	37.50	37.00	37.50	41.00	37.00	46.00	36.00
	Payroll clerks										
	Secretaries	62.00	68.00	68.50	61.50	63.00	60.00	66.50	65.00	65.50	55.50
	Stenographers, general										
	Typists, class A	50.00	55.00	49.50	47.00	53.00	50.50	53.00	49.00	53.00	47.00
	Typists, class B										

CORROSION is a prime destroyer of automatic sprinklers. This is extreme, but less would be just as bad, in case of fire.

LOADING by condensation of fumes can finish a sprinkler. This one, from a roofing plant, wouldn't even know there was a fire.

PAINT knocked out this one. Don't let paint drop on them. Cover them with paper bags when you're painting the ceiling.



MORE LOADING. This coating is like a rock. But the sprinkler was "on duty," in just this shape.

"REPAIRS" that lock a sprinkler up tight cut your fire protection—even if you think the repairs are only "temporary."

MECHANICAL DAMAGE, too, can cause failure. A too-close conveyor belt ground off the bottom of this sprinkler.

These sprinklers were "on the job"—but they were giving no protection whatever. Makes you think—

Have You Checked Your Sprinkler System Lately?

MAYBE NONE of your automatic sprinklers look like the ones pictured above. Yet every one of these sprinklers was actually "in service" in some plant when it was discovered by inspectors. Plant managements depending on them for protection would have gotten a rude shock if they'd had a fire.

Admittedly these are extreme. But they are on exhibit in the museum of Underwriters' Laboratories in Chicago to show "it can happen."

But don't assume you're safe, warn UL men, even if you're sure your sprinklers don't look like these. *You can't tell,* just by looking, whether an automatic sprinkler will operate when you need it. The only safe way to check automatic sprinklers is to remove a sufficient number for sampling and have them tested.

What is a "sufficient number"? And how often should you check? Generally 12 to 24 sprinklers are enough for a sampling. But no general rule can be laid down for frequency of inspection.

For instance, the automatic sprinklers in a plant where corrosive fumes are present should be checked more frequently than those in an air conditioned, dustfree plant. Other conditions, too,

SAFE—AND NOT SAFE. Sprinkler on the left is OK. The one on the right only started to open because of fire nearby. Now it's a water hazard—except that it's wired shut "for safety."

IT'LL NEVER WORK, because no water will come. Someone threaded in a steel plug where this sprinkler entered the water supply line. Thereafter it only looked like a sprinkler.

can spoil a sprinkler. The UL museum shows one from a sugar mill that had a heavy rock-candy coating. It was totally inoperative and it was *less than a year old.*

Your engineer can get sound advice on how often you need inspections from your insurance inspection authority. Your insurance man or the automatic sprinkler contractor who installed your system will tell you whom to contact. In fact, inspection service by automatic sprinkler contractors is now available almost anywhere in the country, at minimum expense.

But the advice from UL is, Don't depend on anyone else's inspectors—they don't necessarily inspect the whole system every time they visit the plant. And their inspections may not be frequent enough for your particular conditions.

Make your own inspections periodically. If any of your sprinklers show signs of corrosion, or any other condition that will keep them from opening promptly when needed, get them tested. And take enough representative samples to be sure.

Look again at those pictures at the top of these pages. Remember that some plant engineer, somewhere, was depending on these sprinklers for protection. Don't take a chance.

Look through the back pages for...

... **Maintenance Pointers.** Here's how to build a humidity and temperature control chamber for work in process. And other suggestions for solving some of a plant engineer's problems. **Page 94.**

... **What's New in Equipment.** Ever hear of "buttoning" metal sheets together? That's "metalacing." One-step process eliminates use of rivets, bolts, welds, or staples. You'll find details on this—and other just-out's—described here. **Page 100.**

... **Practical Labor Relations.** An experienced negotiator tips you off on significant labor developments. **Page 146.**

... **You Mustn't Miss.** Shell molding made automatic and continuous with new 12-station machine. Plus other industrial news and ideas. **Page 158.**

... **Plant Engineering Problems.** How *not* to clean clad-steel equipment. How to resurface a heavy-duty floor fast. Also ways to lick other plant engineering problems. **Page 168.**

... **Plant Operating Problems.** Hints on solving them. Example: New booklet helps you train crane operators. **Page 172.**

... **New Materials.** Latest dope on latest products. For instance: Zeprex, a building material you can work like wood that has the properties of concrete. **Page 176.**

... **Books and Booklets** A guide to current reading that helps you on your job. This month features: "How to Get Ahead in Modern Business" by Harry Simmons. **Page 182.**

... **Behind the Byline.** Photos and thumbnail sketches of FACTORY authors. **Page 192.**

In Part Two of this issue you'll find...

... **Important New Catalogs.** More than 200 of them in four different sections. And free. To get the ones you need for your problem-solving library, just check and mail the reader-service postcard inside the back cover. We do the rest. **Page B-40.**

... **Industrial Films.** Fast-reading reviews. Slanted this month toward training and general orientation on new plants. **Page B-56.**

TIPS TO GOOD HUMAN RELATIONS for factory executives

By M. J. MURPHY • Industrial Relations Editor, FACTORY

NEW LOOK IN ANNUAL REPORTS Westinghouse employees recently received a present—a neat little checkbook for each person on the payroll. The purpose: to explain the company's record of 1952. The checks — all filled out — show the usual annual report figures in a new perspective.

It's quite a job to do something "different" in making annual reports. About every possible method of presentation has been tried. This one probably has, too, somewhere and sometime. Even so, it has the new-look appeal that makes it worth considering.

MEDICAL PROGRAM FOR SMALL PLANT Cooperative medical programs offer real promise for the small company that wants excellent service at low cost (see "Big Plant Medical Service at Small Plant Cost," FACTORY, Sept. 1951, p. 122).

Now the National Industrial Conference board has just released a major study on the subject. The NICB report covers the waterfront, gives ample detail for practical follow-up in your own community. In addition, the report sums up the experiences and practices of six major programs now in successful operation. Good reference material. Survey is No. 134 in the NICB's "Studies in Personnel Policy."

SIMPLE SOLUTION FOR PROBLEM OF SELF-BUSSING Lots of plant executives have played with the idea of self-bussing—having employees clear their own tables in cafeterias. But many have been blocked because their dishwashing rooms are at the wrong end of the food serving area. Result is that carrying trays to the right place creates serious traffic congestion. And cost of relocating dishwashing rooms is usually prohibitive.

One solution is a simple set of racks, as in the photo above. The ones shown have long been in use at Taylor Instrument Companies' plant in Rochester, N. Y. They are located where employees can deposit trays easily on their way out of cafeteria. They're clean and neat, and easily cleared by girls working behind them. Dishes are stacked out of sight and moved to

washing area when rush period is over. Racks can also be removed when cafeteria is cleared for social events. Method is inexpensive, saves considerable in labor cost for clearing tables. Employees like it. In fact, according to Assistant Industrial Relations Manager Gus Opperman, the idea was submitted to the suggestion system by an employee.

MAN-OF-THE-MONTH BOOSTS SAFETY Armco Steel Corporation's Rustless plant in Baltimore has an interesting, surefire method for personalizing its strong safety program. The plan, now over four years old, works like this:

Once a month the Rustless Safety-Man-of-the-Month Committee looks for a star employee to honor. First step is to put all employee clock numbers in a hat. The committee draws a number. If the employee picked has had a perfect no-accident record the past year, the committee then goes to visit him—unannounced, of course—at his workplace. There he's put through a grueling safety test. His workplace, clothing, safety equipment, and housekeeping must be tops. Only then does he get the nod. If he fails the test, the committee picks another candidate and repeats the process until it gets a winner.

The man-of-the-month gets a special prize, and plenty of recognition. And safety gets a good shot in the arm. Sounds like an ideal combination.

MORE ABOUT NEW KIND OF "MAGAZINE" March FACTORY (page 152) told about a new kind of employee magazine, published right in the pages of a local town newspaper. The following letter from reader Paul A. Caldwell attests to the value of the method, and gives details that may help you evaluate its possibilities for you:

"We are beginning our fourth year here at Mooresville Mills (Mooresville, N. C.) with just such a publication as you wrote about, and we have been quite happy with the results.

"Four years ago a survey was made and it was learned that 96% of our 3200 employees were regular subscribers to the *Mooresville Tribune*, weekly newspaper with some 7000 circulation. We then contracted for a 2-page center spread each week, 52 times a year, which costs us $150 per week. Our distribution problems solved, we came up with our own name for the two pages, which are devoted solely to employees and their activities. The publication, *Mooresville Medallion* has become a community-wide project.

"With a community and industry as closely related as ours, we feel that this type of publication has been far more successful than we imagined at the outset."

SUPPLEMENT FOR EMPLOYEE BOOKLET Detroit Aluminum and Brass Company, in its new plant at Bellefontaine, Ohio, has come up with an interesting supplement for the usual booklet and other literature for new workers.

The company is using a 12-in. record which it presents to each new employee. Many facts are narrated on the record against a background of music: working conditions, safety, company products, history, etc.

The record, which is 2-sided, contains "dramatic episodes built around the use of bearings which the company manufactures for a half dozen of the nation's top automotive plants." The sketches involve aircraft, agricultural, and other uses, which add story interest. Some 12 voices are heard in addition to the music. These include veteran employees as well as company officials.

An interesting slant: The company decided to go ahead with the idea despite the possibility that not all new employees will own record players. Reasoning is that additional values would be realized because employees, curious about what was on the record, probably would take it to friends or neighbors owning record players. Thereby the company story would get an enlarged audience.

HAROLD E. BLISS
Assistant Controller
Lukens Steel Company
Coatesville, Pa.

W. H. PAGENKOPF
Superintendent
Technical Service
Western Electric Company
Hawthorne Works
Chicago

R. S. STEWART
Commander, CEC, USN
Bureau of Yards and Docks
Washington, D. C.

STUART WHITEHEAD
General Superintendent
Maintenance and
Construction Department
Calco Chemical Division
American Cyanamid Co.
Bound Brook, N. J.

JOHN B. WHITLOCK
General Maintenance
Engineer
Armco Steel Corporation
Middletown, Ohio

Were you there? Did you hear the panel discussion on "Maintenance Essentials" at the Plant Maintenance Show? If not, here is your opportunity to catch up with good current practice as five experts answer questions on . . .

Maintenance Costs and Budgets

Q Who should decide whether to classify a job as a repair or a replacement?

A BLISS: We do it this way: The controller sets down the broad policy as to what constitutes a capital item and what constitutes a repair item. Our cost control people in the plant engineering department write the work order and assign the charge account number based on that general policy. But we went a step further. We set up a facility inventory number, with a number for each machine. We also classified machines by type of maintenance and set up an accounting charge account number. So all they have to do in cost control is look at the inventory card to determine what account number the job should be charged to—accounting-wise. The only question they may have to raise is: Is it a capital addition or not? If it isn't clear-cut, then they have access to the controller to get a decision. Otherwise it is pretty much up to them to make their own decision.

I'd also like to point out one important difference in my own company's allocation of expenditures. We try to determine before a job is done whether it will be capitalized or charged to expense. We do that within a broad policy limit established by the controller. Then if there are questions—I mean, "hairline" decisions as to whether jobs are replacements, or repairs, or rearrangements—we leave it up to the controller's office.

Q Should maintenance expense be allocated directly against the department where it occurs?

A PAGENKOPF: I think that depends to some extent on the size of the plant. Our organization, at Hawthorne Works, is a large one with many departments and a number of satellite plants. The "recovery" of maintenance expense is on the basis

of each productive hour, established as a result of budget studies. After we have set up a budget, based on standards, we issue control reports that are passed out to all supervision. Our aim is to come up with a sort of measuring stick of our performances as against our budgetary estimates. We talk in our plant a great deal about "dollar to dollar." If you ask a foreman how he is making out on his maintenance budget, he will say, "I made $1.02, or 97 cents." What he means is that he expended, in operation of his department, 97 cents, for example, for every dollar of expense that he was permitted under the budget.

BLISS: When we talk about the accumulation of maintenance costs, I think we ought to be thinking both in terms of control and impact on final product cost. In one plant, an inaccurate distribution of repair and maintenance costs had such an impact on product costs that the company ceased to be competitive. The sales department said, "Look, every piece of product we sell we are taking a loss on." A subsequent analysis disclosed the fact it was simply overloading of maintenance shop costs that created the condition. And that was a large company, not a small one.

Q Can budgets be applied to all phases of maintenance work?

A BLISS: It depends on what kind of budgets you are talking about. I'd say, as a broad general principle, that all types of maintenance work can be budgeted. But, remember, there are various types of budgetary control techniques that can be applied. Some of the most difficult elements to be budgeted are those that fall in the category of emergency repair work—the special jobs that creep in unannounced and unsuspected, and are over and beyond the elements you normally plan for.

For example: You certainly aren't going to operate without an over-all plan, setting forth precisely what you are going to do, where you are going to do it, what men and facilities you are going to use to achieve your objective. For that reason, if you tie that planning into a budget in terms of man-hours, machine-hours, and dollars, you develop a far more effective control of your general maintenance activities than if you say, "Well, certain areas we can budget and certain areas we can't."

Q Should major repairs and installations be put on a budget basis? Or should separate appropriations be requested after costs have been estimated?

A WHITEHEAD: For purposes of control, by all means put them on a budget basis. However, as the specific jobs develop and it is necessary to do these jobs—it is customary, in most plants, to get individual approval. For instance: On roof work or painting work it is easy to anticipate what you are going to do next summer. Then when next summer comes—well, most plants require top management approval on any sizable orders.

WHITLOCK: I think a certain allowance should be made in your budget for major repairs, perhaps based on past history. Our practice on major repairs, however, especially if they are of an emergency nature, is to have an estimate made of the cost to repair. Then an order is issued, if approved by the management. All the charges are allocated to that particular order, and it is not charged against the budget dollar.

STEWART: I more or less agree that the major repairs and installations should be put on a budget basis. Our experience tells us, insofar as emergencies are concerned, that they amount to a certain percentage of our total expenditure each year. One of our principal efforts, of course, is to reduce those emergency expenses. If we anticipate our major repairs through a maintenance inspection program, then we should be able to budget for them on an annual basis.

WHITLOCK: When the work load is changed in a department whose equipment has been designed to do a certain job, and extraordinary repairs are created as a result of this change in the work load on the equipment, is it possible to have that on a budget or should that not be classed as extraordinary expense?

STEWART: When you put it that way I will have to back up a little bit. Expenditures of that type, which cannot be anticipated, must be taken care of by special requests to management for additional maintenance based, of course, upon changed conditions.

BLISS: It seems to me that it is very important in our long-range planning, to think about the extra installations or major repair jobs we are going to do and provide for them in the budget on a carefully worked out basis. The practical effect of allowing them to float through as loosely budgeted items—so much money—seems to indicate a lack of planning, which, in many instances, is really essential to controlling the cost of particular jobs. I have seen this happen many times. Some production department will propose an addition of some type of equipment, without giving it too much thought. It will be included in the budget and, eventually, be installed—and after it has been installed they discover it doesn't do the job for which it has been intended. In my company, we actually prepare an appropriation built on careful studies both by our plant engineering and industrial engineering departments. It is then evaluated by the various superintendents involved, to make certain

that we have the right kind of equipment. Problems that might occur in connection with our union contract are all carefully thought out and provided for in advance. When the appropriation is eventually written, we can be sure we won't exceed the amount. If we do, somebody is going to be called on the carpet.

To cite one example, just the other day we made a preliminary request based on a department's tentative figure of $47,000. Under the old procedure that is the amount that would have gone into the budget, and that is what would have been appropriated. But, on subsequent review by the various individuals concerned, it was discovered that a lot of equipment should be added to make it truly effective. Eventually the appropriation exceeded $75,000, but we are quite certain that the equipment will do the job.

STEWART: I should like to emphasize one point brought out before, that all too often the emergency has become a synonym for poor planning. Better planning will, very often, resolve many of our budgetary difficulties.

Q Can maintenance costs be budgeted by the application of unit cost factors to such items as floor space, machine investment, and direct labor hours?

A PAGENKOPF: Depending on the size of the plant and the type of operation, it can be done to some degree. I have been in small plants where we could establish the factor based on direct hours, but I think you will rarely find instances where you can base it on unit factors that are reliable.

Q Who should be responsible for the development of a maintenance budget?

A PAGENKOPF: We get our production and maintenance people and the product engineer together and finally arrive at a figure—with cost accounting people sitting in and giving us the benefit of past experience. As a result, we come up with a budget that looks reasonable. When it gets to top management, they cut it a little bit.

Q Should maintenance costs in a highly mechanized factory be recovered in overhead charges or charged direct as operating expense?

A BLISS: It depends a little on the type of industry you are talking about. But it is particularly true in the heavy goods industry where you may incur tremendous repair maintenance costs in a particular period, and then not incur them again for a period of years. If you charge them directly as operating expense, they immediately reflect in your product costs and inventory evaluation—which creates an entirely distorted picture. In general, therefore, the use of a deferred maintenance expense account seems to be the best way to handle it, because you recognize that you will spend the money, that it must be taken as a part of your product cost and recovered from your sales dollar. Incidentally, the Treasury Department doesn't recognize your deferred maintenance reserve—only gives you credit for what you spend.

Q In your experience, Mr. Bliss, how do actual costs compare with estimated costs?

A BLISS: That is sort of a $64 question, unless we define a little more closely the basis on which our estimates are prepared. I would say that, in many companies where I have had a chance to review their maintenance set-up, the estimates and actuals eventually seem to come quite close. However, if the estimates are based on an accumulation of experience data, particularly if the data are not current, I have seen variances run as high as 200%, plus the minimums.

I visited one company, four or five years ago, that thinks well enough of its estimating procedure to pay its men an incentive earning on the amount by which they beat the estimate. I asked the operating vice president: "What happens if the estimator says a job should take 24 hours, and the foreman knows it should take 36 hours, so he tells the estimator it should take 36 hours and that it is unfair?"

The vice president said, "It is 24 hours." He added, "Confidentially, I might call the estimator in on the carpet for that, but in the main we find our estimates are so close and so valid that we can afford to pay an incentive on what the men beat those estimates by." And in looking over the estimates, I thought they were very tight.

This matter of estimating can be a very dangerous thing unless it is set up on a sound basis. If you are thinking of using estimates for control, from the viewpoint of scheduling and shop loading, it becomes more important than ever to have a good solid basis for the standards. You should also have some procedure for the current review of the standards you are using to discard obsolete data. You should, particularly, have some way of knowing when changes in operating methods occur in the plant, because they have a tremendous impact on the value of your estimates. I dare say that one of the major points in which our estimates go haywire is in the area of changing methods.

Remington Rand Methods News

Simplified, visible production control for maintaining schedules

What's the status of any (or all) jobs in your plant? What assemblies, parts, machines or manpower will you need to maintain schedule. What are the delivery dates? These *facts*, with complete supporting data can be available *instantly* in one simplified, visible record—SCHED-U-GRAPH.

SCHED-U-GRAPH completely centralizes *all* the necessary information for effective production control. There's no digging in statistical reports, tub files, registers or card files. No hurried phone calls. Everything you need is conveniently charted, up-to-date and instantly accessible. SCHED-U-GRAPH so simplifies production control that any supervisor, or even a clerk, can answer *any* question about *any* job at *any* time.

Can SCHED-U-GRAPH help keep *your* production on schedule? We believe it can. And to prove our point, and to give you further information about this flexible, convenient control, we have prepared a case history folder which explains how Tinker AF Base *simplified* production control with SCHED-U-GRAPH. This four-page certified report explains how this huge Air Force Depot uses SCHED-U-GRAPH boards to maintain full control over such diverse operations as: An aircraft assembly line three-quarters of a mile long, a series of shops for repairing and manufacturing parts and accessories, and a network of administrative offices.

Let us send you this complete report. You'll quickly see how SCHED-U-GRAPH can offer *your* business, no matter how large or complex, the same convenient charting of job statuses, item by item, with integrated full supporting data in one easy, accessible record. Ask for **Certified Report #795.**

Portion of SCHED-U-GRAPH installation at Tinker AF Base. Each board is 48 inches high by 44 inches wide and carries 100 visible file pockets. Fiber Guide Wheels permit the board to be raised or lowered for reading or posting.

Tabulating machines prove a boon for medium-sized plants

You don't have to be a giant of industry to realize important savings through the use of punched-card tabulating equipment.

One west-coast tool manufacturer, with 675 employees, centered all its machine hours, labor, sales analysis, payroll and special reports in *one* 5-clerk department, thanks to the efficiencies of punched-card procedures.

What were the savings? In sales analyses alone punched cards gave them a report that previously took 37 days, *in the amazingly short time of 3 days!* Payroll preparation, production control, labor distribution, efficient inventory, even income tax returns for employees were handled with similar efficiencies in time and expense. In the words of their chief accountant: . . . "it would have been difficult to operate with anything like our present efficiency, without these economical and *complete* production sales and general accounting controls." See **Certified Report 804.**

15 or more carbon copies at one typing

"One great advantage of the electric machine is the number of clear carbons that can be obtained, particularly for government contracts" writes the President of a Boston manufacturing company. Let us show you how the Electric typewriter brings you dividends of sharp, clean carbons, as well as increased production and distinctive printwork. Write for Case History **RE 8536** and "Take a Letter" **RE 8499.**

How to solve troublesome "peak load" invoicing problems

A manufacturer of electronic equipment writes us: "Since we have been using the Printing Calculator for extension and computing taxes, invoicing has kept pace with shipments, *even during peak periods.*" Read the complete history and learn how this all-purpose machine combines short-cut multiplication, automatic division, high-speed addition and subtraction in one unit. Ask for **folder AC633.**

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A TOBY QUINT EPISODE:

Jack slammed a 75-watt bulb into Toby's wastebasket.

The Plant Engineer Gets Mad Again

By RAY W. SHERMAN

ONE OF THE JOBS of Plant Manager Tobias Quint was to let any of the Central Manufacturing staff get mad at him. They seemed to feel better after they'd hung his hide on the fence to dry.

When he saw a "mad" coming, he tried not to smile. That only made 'em worse, particularly Plant Engineer Jack Dean, who claimed there hadn't been a bright spot in his life since the personnel man sat on a freshly painted bench four years ago.

Toby guessed his plant engineer was mad as soon as all six feet of him appeared in the door. He was sure of it when Jack slammed a 75-watt bulb into Toby's wastebasket and let go with a few well-chosen expletives.

"What gives, Jack?" Toby lighted his corncob.

"I'm out in M-T. Old Tom Callahan's conveyor is acting up again. We're right in the middle of things when the bell clangs my number and I rush into Tom's office. I figure the plant must be falling apart some place. Guess who it was."

"Oh! Eden! Churchill! Malenkov! Eisenhower!"

"You're close. The operator said none other than Mr. Rupert G. Marcus, well-known secretary of Central Manufacturing, wished to confer with me. So-o-o-o, I waited till he got on the line.

"Must have been serious." Toby's brows lifted.

"Very serious. He said: 'Mr. Dean, the overhead light in my office has gone out and I wish you'd come up and fix it.' So I squeezed out an 'OK, sir,' and went and got a bulb and a stepladder and fixed his gol-darned light and I hope the first thing he reads by it says his mother-in-law is coming for the summer."

Toby pursed his lips. "H'm-m-m."

"H'm-m-m for me, too, while you're at it," Jack growled. "Some folks around here think a plant engineer is a fix-it with a pair of pliers in his hip pocket. My clerk could have handled that lamp. But no! Rupe's gotta get ME on the phone and ask ME to fix it! Won't he ever learn that a plant engineer is an administrator, not an office boy?"

After a bit he added: "Toby — you gotta do something about this!"

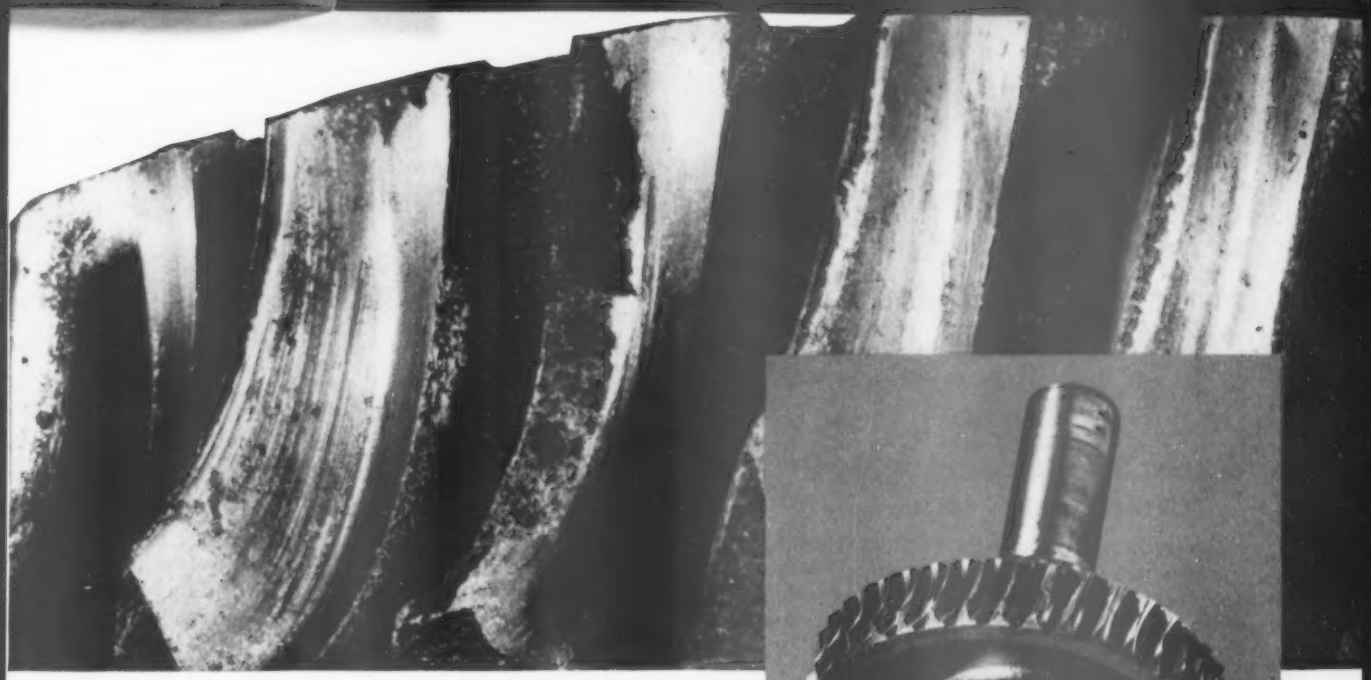
Toby scowled. "Is there much of it?"

"More than you'd think! Soap dispenser won't work! Door squeaks! Window sticks! Weather's cold and forsythia's late! The one solution—'Get the plant engineer on the phone!' "

"I'll fix it, Jack—I hope," said Toby. "I didn't know it was that bad. Your clerk can handle minor complaints. I'll write a memo. I'll talk to 'em about it. I'll do the best I can." Jack started for the door. "But wait, Jack! You'd do something for me—wouldn't you, Jack?

"Our brass — couldn't you humor some of them —just a little bit—once in a while? You know—"

"I think I know!" Jack laughed. "You take care of the rest of 'em and I change bulbs for old Rupe Marcus. I guess I could do that. After all," he shrugged, "I've been Rupe's janitor for going on fourteen years. He'd probably hate to change."



Unretouched photographs of worm gear ruined by former lubricant. The teeth are badly worn and the metal has crystallized and fractured. The sugar and starch-laden atmosphere, high temperature, extreme overload, and slow speed demand a lot of a lubricant.

SUNEP ELIMINATES FAILURE OF SLOW-SPEED WORM GEARS

To help satisfy America's sweet tooth, Leaf Brands, Inc. resorted to a 70% overload on its revolving candy pans. This weight, plus slow speed, sugar and starch-laden atmosphere, and surrounding high temperatures, resulted in an average of 450 worm gear unit failures in one year. The lubricant could not take it.

After a test of a number of extreme pressure lubricants Sunep was selected. Because of damage caused by the former product, some units broke down during the first months following the change-over. But in the last 5½ months there hasn't been a single failure. Far less Sunep has been required, and records show an overall saving of over $20,000 in the year it has been in use.

Send for our new booklet "Sunep"—it will not obligate you. SUN OIL COMPANY, Philadelphia 3, Pa., Dept. F-5

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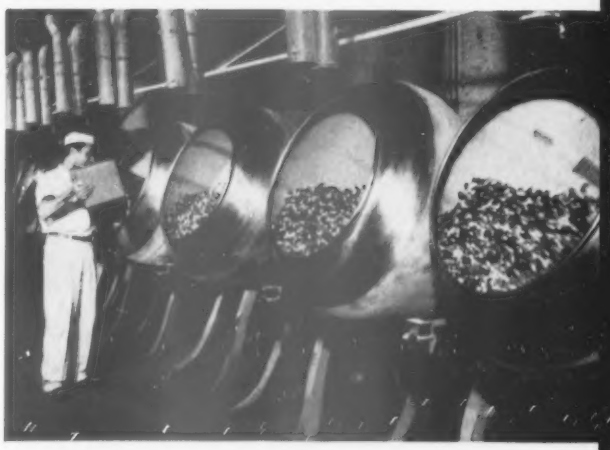

These revolving candy pans operate at 30 rpm. Sunep keeps them turning in spite of 70 percent overload.

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JOE'S DEPARTMENT

ELECTRICAL IDEAS EVERY PLANT MAN CAN USE

By JOE ST. ANDRE • Electrical Editor, FACTORY

• MAKE 'EM USE EXPLOSION-PROOF PORTABLE LIGHTS ONLY

Recent headline in a New York newspaper:

"Two men burned to death, another near death." The men were working inside a tight enclosure when somehow gasoline fumes seeped in. Somebody dropped the extension lamp and you know the rest.

You just have to knock it into the heads of all your people that only explosion-proof portable lights should be used in an enclosure. Every trade needs to learn the lesson. The two men referred to above were masons.

Manholes, tanks, and tight enclosures are all potential hazardous locations. You never know when gas or fumes may kill. A good practice is to have the men wear harnesses with ropes attached. In case of trouble, you haul them out without having to risk the lives of more men to get them out.

Your people will probably scream at just the thought of wearing these harnesses. They're the same bunch who object to wearing safety glasses. I would get tough with that kind and really lay the cards on the table. It's up to supervision to stress safe practices to the men under them.

And remember: It's just as important for your men to know safety precautions as it is for them to know their trade.

• ARE YOU ABSOLUTELY SURE THAT THE JOB'S COMPLETED?

Not if your electrical men haven't cleaned up the many pieces of conduit, fittings, scraps of wire, etc., that are always left over.

Often the electricians are the last men on the job. You can tell, too. It doesn't take a private eye to follow the trail of assorted electrical junk and left-over material strewn around the job.

What to do? It's up to electrical supervision to see that the job isn't turned in as complete until it's as clean as it was when you came in. It may take some selling, but the thing is: Make a start now, brother, or, take it from me, you'll be in the junk business before you know it.

Another piece of advice: Haul your unused conduit, fittings, straps, boxes, switches and the rest back to stores, not the electrical shop. In the storeroom those parts can mean money in the bank. In the electrical shop, they only mean more junk-piles. You've seen how that stuff piles up in the shop when you're doing lots of electrical construction. Well, the electrical boys are just not going to search the heap for what they want—it's lots easier to ask for it at the storeroom. Even if they're the type that like to look for needles in haystacks, you don't want to pay for their time.

• PLENTY OF ELECTRICAL ENGINEERS IN YOUR FACTORY OF THE FUTURE

"U. S. industry now requires one engineer for every 60 employees. In 1900, one engineer sufficed for every 250 employees. In the General Electric Company, the ratio is one engineer for every 20 employees."

I'm quoting Dr. C. G. Suits, vice president and director of research for G-E. Looks like you and I will never see the day when there are too many scientists and engineers in industry.

In product design, there are electrical controls to do everything but pay for the drinks. Where would you be without your electrical engineer to tell you how and where to mount them?

In the plant, hundreds of mechanical functions depend on electrical devices to signal or control operations. Who's going to design exactly what you need when you need it?

In processing, you're loaded with controls, most of them electrical. Brother, you need an electrical engineer to keep you in business.

In materials handling, you need an electrical engineer to find the right interlocking to do the job.

In power distribution, who else can you count on to select your high-voltage and other equipment, your lighting, your substations?

And on top of all this, don't forget you have to keep your power supply coming at all times. You've got to have highly trained engineers who can act quickly in time of trouble to restore power fast.

Now what does all this add up to? That more and more electrical engineers will be working in industrial plants, sure. But industry wants electrical engineers who can grow with the plants. In the plant of the future, the electrical engineer's job will be a big one, and it will call for big men to do it.

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Available in 200-, 300- and 400-Amp. production welding models, N. E. M. A. rated.

OUTPERFORMS ANY MOTOR GENERATOR SET MADE!

No moving parts to wear out. No brushes and bearings to replace. No commutator to corrode or turn down . . . maintenance expense practically eliminated.

Instant striking and smoother arc! There's no inductive time lag usually found in motor generator sets.

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Eliminates stack failure. High-velocity, down-draft ventilation provides plenty of cooling air within the machine. There's no need for thermostatic protection, no interruptions because of current cut out! Even when short circuited while set at rated output, rectifier-stack temperature rise is held below critical levels!

Eliminates machine noise and current creep. No large magnetic forces develop to cause vibration or tear the machine apart, thanks to its moving-coil design. And positive air separation between primary and secondary coils guards against insulation failure which otherwise might put line voltage on welding leads.

If your jobs call for DC welding . . . you'll weld faster, better, at *less* cost with this new A. O. Smith D. C. rectifier welder—an entirely new concept in D. C. production welding!

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MAINTENANCE POINTERS

FOR PLANT OPERATING EXECUTIVES

BY CARL G. WYDER • Maintenance Editor, FACTORY

With many new process materials coming in, you may need ...

... an Easy-to-Build Humidity Control Chamber

More and more plants are finding need for special chambers for temperature and humidity control of work in process. Such a chamber, shown above, was built at the General Electric Company, Pittsfield, Mass.

This chamber was specially designed by Bowser Technical Refrigeration of Terryville, Conn., for processing transformer insulation. It is made of prefab insulated panels that were assembled on the site. With standard inside dimensions of 11 x 6½ x 14 feet, the room can be easily lengthened or shortened by adding or removing individual panels.

The construction is interesting—the room, you know, has to be hermetically sealed. Wood framing, plus tierods, holds the box together. Panels are made of aluminum-clad plywood with a 4-in. layer of glass insulation. The idea is to avoid need for painting and to minimize maintenance.

All doors are gasketed. A perforated ceiling plate serves as a plenem chamber for air conditioning. All mechanical apparatus and controls are outside.

How to Get Good Ideas From Visiting Firemen

We recently spent an afternoon touring the Elizabeth, N.J., plant of Reichhold Chemicals, Inc. Our guide was George Matko, plant engineer.

We appreciated his taking time out of a crowded day to guide us around. George reversed the compliment quickly. Said he:

"It's my policy. I always start off this tour with anyone with one understanding. Do you agree to spend some time with me after the tour to give me your reactions to what you see, your criticisms, your suggestions?"

We agreed. And later we asked George more about it. We found he extends this courtesy to suppliers of equipment, sales engineers, visitors (editors, foreign delegations, and even students), men from other plants, and customers.

"Why," said George, "I've gotten more technical help this way than by any other way I know of!"

New Light on Cracks in Masonry Walls

Delayed hydration and gradual expansion of mortars containing free magnesium oxide may cause cracking of masonry walls. This conclusion results from a recent study by J. W. McBurney at the National Bureau of Standards.

Tests on experimental brick walls showed 5 to 10 times as much expansion in walls not laid with mortar made with high-calcium hydrated lime (free from unhydrated magnesium oxide).

Among many actual masonry failures investigated was a brick wall with a structural clay tile back-up. In two years many of the mortar joints had cracked, and the walls were bowed outward as much as 2⅜ inches in a 25-ft. height. Also, the corners of the foundation had cracked, door frames had lifted, windows were jammed, and parapet corners had been noticeably pushed outward.

Samples of mortar from this wall showed a high percentage of unhydrated magnesium oxide.

How to stop wall failures of this kind? The Bureau suggests you use masonry cement which passes the ASTM test C 151-49, which limits linear expansion to 1%. Or that you use only type S (Special) hydrated lime.

Another good piece of advice: Should a wall failure develop from use of insufficiently hydrated materials, don't be too quick to repair it. If you can, delay the job until all hydration of free oxide has run its course. For if you don't, new failures will develop, and you'll be in for more repairs.

For more details ask the National Bureau of Standards, U. S. Dept. of Commerce, Washington 25, D.C., for McBurney's report "Cracking of Masonry Caused by Expansion of Mortar."

Turn to page 168 for good ways to solve special plant engineering problems

Alemite "Friction Fighters"

save $11 every 8 hours on one machine!

...cut downtime 80%!

Lubrication trouble on a vital machine in a big Detroit automobile plant. Gallons of oil being wasted. Man-hours climbing. Spilled oil creating a major housekeeping problem—hazardous working conditions.

A trained Alemite "Friction Fighting" specialist was called in. After careful study, he recommended the installation of an Alemite Lubrication System. A system that would lubricate all 55 bearings of the machine simultaneously!

The change was unbelievable! Foremen said they'd never seen anything like it! Within a 24-hour period, oil consumption was cut 20 gallons! Lubrication downtime was decreased 80%! Bearing temperature was lowered 40°! The housekeeping problem was eliminated! *Estimated saving every 8 hours—$11! A total of $2869 a year!*

★ ★ ★ ★

Alemite's 35 years of experience in conquering friction can work for *you*, too! An Alemite Lubrication Engineer can show you how to save. Help you to cut costs, decrease downtime, increase profits! For further information, contact your Alemite distributor—*today!*

Alemite—the great name in lubrication serves the great names in industry

Wherever metal touches metal, wherever you find machinery in motion, you're most likely to find Alemite Lubrication and Lubrication Systems on the job. Here are but a few of the industrial leaders who use Alemite.

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management data sheet 72

By WILLIAM T. CONWAY • Behr-Manning Corporation, Troy, N. Y.

Eight Ways to Cut Costs on Coated Abrasives

Many companies use a large volume of coated abrasives without having close supervision over their use and application. This practice results almost inevitably in waste and extra cost.

Since coated abrasives fall under the classification of expendable tools, many plant people think of them in terms of a fixed cost on an operation without looking for ways to reduce this cost. Actually, there are many ways to save money on coated abrasives, regardless of whether you use them in the form of sheets, belts, discs, or rolls. The following eight ways are basic:

1. PROVIDE PROPER STORAGE FACILITIES

a. Keep cartons off the floor. Wet or damp floors will rapidly deteriorate most coated abrasive products.

b. If you use rolls, do not stand them on end after the roll has been opened. The edges can be easily damaged. Lay them flat on shelves or pallets.

c. Storage room should not be exposed to excessive heat or cold, dryness or dampness. Best conditions are temperature of around 70 F and relative humidity of 35% to 50%. Simple inexpensive equipment is available for controlling humidity.

d. Open cartons only as materials are needed. This will avoid unnecessary exposure to the atmosphere and will also facilitate identification of material.

e. If a quantity of material must be kept in the work area, it should be stored in a cabinet. A shallow pan of water in the bottom of the cabinet and a lighted 100- or 150-watt lamp bulb in the top of the cabinet will help keep material at the corect conditions of temperature and humidity.

2. WATCH YOUR INVENTORY

Too much stock may result in. . .

a. Deterioration of material before it is used.

b. Oversupply of an item which cannot be used due to a change in plant operations.

c. Having to use an obsolete coated abrasive item where it should not be used in order to reduce inventory.

Too little stock may result in. . .

a. Having to use a coated abrasive item that is not the correct material for the job, resulting in poor production and incorrect finish at a higher cost. This may also affect costs on subsequent operations.

b. Having to use the coated abrasive item in short supply beyond its useful life, resulting in burned or burnished work and slower production.

c. A costly rush shipment by special carrier.

3. ROTATE YOUR STOCK

Storekeepers should use up balance of older shipment of coated abrasives before starting on newest shipment, to avoid possible deterioriization of stock.

4. CONTROL ISSUES FROM STOREROOM

a. Storekeeper should issue coated abrasives to operators either once a day or as they are needed and keep a record of use by each operator. Many plants require operator to turn in used material to storekeeper before receiving new material.

b. The record of usage by operator can be tied in with supervision. Operators who use excessive amounts of coated abrasives may need instruction. Or machine may be in need of repairs.

Turn to page 98

DOW CORNING SILICONES

give motors more muscles

Triple production; cut tool cost over $200 a month

OPTIMUM cutting speed of the 6-32 taps in the 4-spindle drill press operated by the Allen-Stevens Corp., contract die casters of Jamaica, L. I., New York City, is in the range of 1800 rpm. In an automatic feed machine, that spindle speed means about 1450 cycles, or 2900 full reverses per hour.

That many reverses overheated the 1 hp Class A insulated drive motor so badly that it had to be shut down a total of 2 hours out of every 8. To keep the machine operating 8 hours a day, spindle speed had to be reduced to 655 rpm—resulting in tap breakage averaging $10 a day.

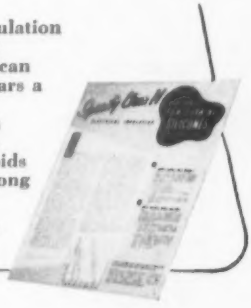
Allen-Stevens got themselves out of the dilemma by rewinding the motor with Class H insulation made with Dow Corning silicones. Spindle speed was immediately returned to optimum, and tap breakage stopped. Production has since tripled. Lost time has been eliminated entirely.

That's the kind of performance that has persuaded alert production, maintenance and top management men to specify Silicone (Class H) Insulation for hard working motors. Used to uprate motors by as much as 50%, it gives you more power at no additional expense for fittings, mounts or wiring. Cost is very little more than rewinding with the next best class of insulation.

free booklet

. . . tells how Class H insulation made with Dow Corning Silicones is saving American industry millions of dollars a year. See how Silicone (Class H) Insulation can be used to make motors, transformers and solenoids last 10 to 100 times as long as they ever did before.

Write for your free copy.



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DOW CORNING CORPORATION, Dept. L-5, Midland, Michigan

Please send me:

- ☐ Performance data on Class H equipment
- ☐ List of Class H Rewind Shops
- ☐ Catalog of Class H insulating materials
- ☐ Data on Silicone Grease for motor bearings

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In Canada: Fiberglas Canada Ltd., Toronto

In Great Britain: Midland Silicones Ltd., London

management data sheet 73

Eight Ways to Cut Costs on Coated Abrasives

... Begins on page 96

c. Total daily or weekly usage figures will bring to light excessive usage of an item. Investigation of this excessive usage may show something wrong with material being ground, with previous operations, or with the coated abrasive machinery in recent years, making

5. CHECK USED MATERIAL

Someone in supervision or methods engineering should periodically examine used coated abrasives and ask himself the following questions:

Has useful life been exhausted?

Medium grits and coarse grits which have become dull after use can very often be used on finer operations or for reworking defective parts. The use of grease sticks or compounds will often give added mileage to coated abrasives after they appear to be completely used. Coated abrasive discs which have been worn out around the outside circumference can be cut down to a smaller diameter to utilize the unused area of the discs.

Is the item the correct size for the job?

Perhaps a smaller sheet or narrower belt will do the same job at reduced cost. Visual examination of used materials will quickly show if very much abrasive surface is being wasted. Everyone has a natural tendency to work in the middle of a belt or drum cover. Operators may be able to get added life out of material by working on outside edges.

6. SET UP REGULAR MACHINE MAINTENANCE

Many plants rely too much on operators to keep coated abrasive machines in good running condition. Although many machines are fairly simple in construction, they still should have a regular schedule of maintenance check up, cleaning, and lubrication. A neglected machine can result in broken belts or torn drum covers.

7. EVALUATE ALL POSSIBLE NEW APPLICATIONS

On a new operation or even a minor change in an old operation, you should. . .

a. Evaluate various coated abrasive products and grits. Be sure you are using the proper type of grain, the correct grit number and backing. The wide choice of coated abrasive products available should be carefully studied to get the best possible results.

b. Determine the best machine for the job. There have been many advances in coated abrasive machinery in recent years, making it possible to find a standard machine to fit almost all grinding or sanding requirements. Minor changes in standard machines can be made if necessary at little extra cost.

If special machinery has to be built to do a specific job, you should consider size and form of the coated abrasive material to be used. If at all possible, it is best to use standard sizes and forms of coated abrasive to insure availability and quick delivery when the machine is put into production use.

c. Test different types of contact wheels if it is a belt operation, or back-up pads if it is a disc or oscillating machine job. The proper selection of this item can greatly influence the performance of the coated abrasive.

d. Try different machine speeds to determine the most efficient speed for your operation.

Most coated abrasive belt machines are run at a belt speed of 5500 to 7500 surface feet per minute, but speeds lower and higher than these have proven to be more efficient for specific operations.

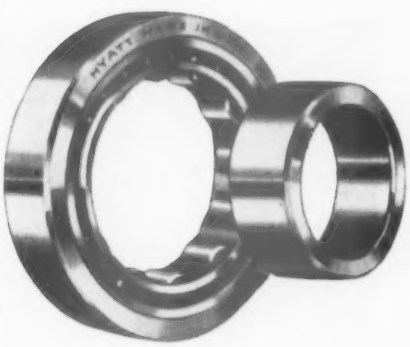
Consult coated abrasive engineers for recommendations on all four of the above items. Arrangements can be made to have sample parts finished in demonstration rooms maintained by coated abrasive manufacturers.

8. WATCH FOR NEW COATED ABRASIVES AND NEW MACHINERY

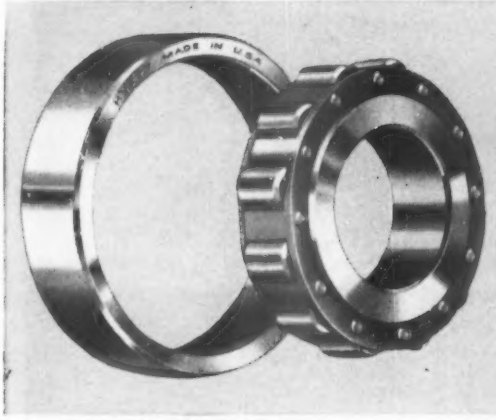
New and improved coated abrasives are being developed constantly. They can represent sizeable savings in coated abrasive costs to you.

New coated abrasive machines are being developed constantly. Very often, the cost of a new machine will be paid for in one year or less by savings on coated abrasives, increased production, and savings in labor.

3 ways to handle your RADIAL LOAD PROBLEM



1 If your design requires a large shaft diameter to produce greater rigidity without disturbing boundary dimensions, a separable inner race type Hyatt Hy-Load bearing can be used with the inner race omitted. Rollers operate directly on a suitable hardened and ground shaft.

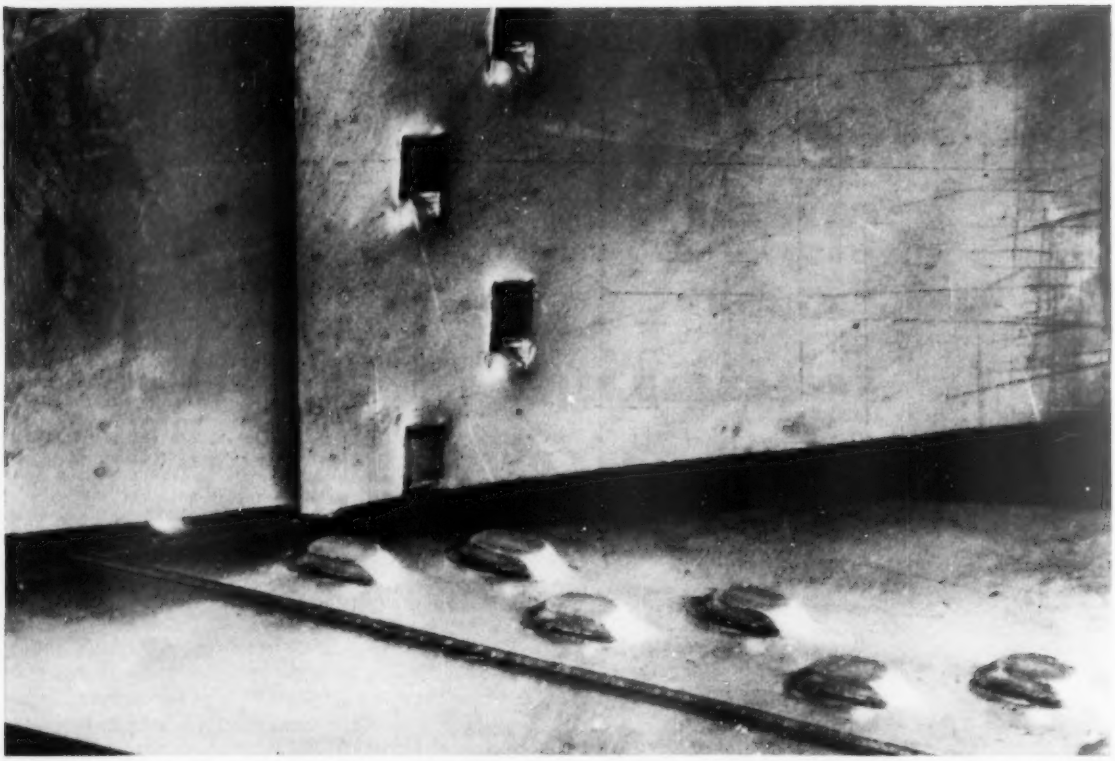


2 When the housing bore must be kept to a minimum, a Hyatt Hy-Load bearing with a separable outer race can be used—with the outer race omitted. The rollers then operate directly in a housing bore of suitable hardness and finish.

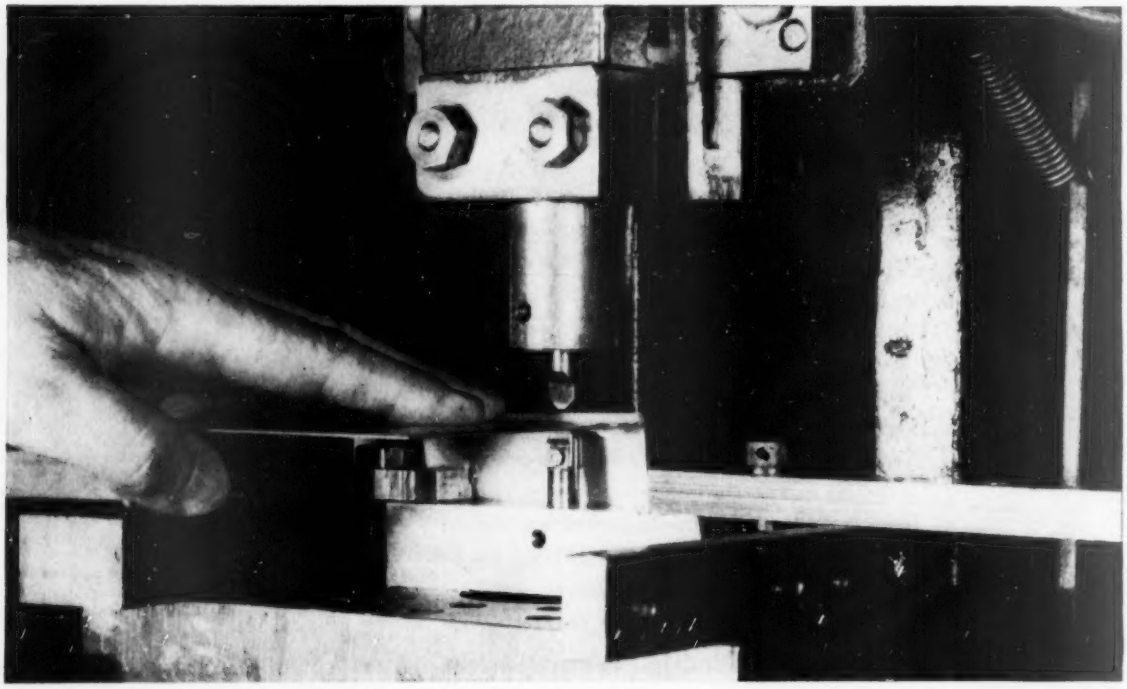
If your design applications involve radial loads, the best way to handle the job is with Hyatts—for Hyatt offers industry's most complete line of straight radial roller bearings! Hyatt Hy-Loads, for example, are made in three diameter series and two basic widths, to standard dimensions. There are ten major types—for the heaviest radial loads, and light or intermittent thrust loads. Four have separable inner races, two have separable outer races and four are non-separable, thus permitting wide flexibility in design and assembly procedures. Write for our general catalog No. 150—it will put the solution to any roller bearing problem at your fingertips. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

3 For designs requiring a bearing installed as a unit, there is the non-separable type of Hyatt Hy-Load. Whether you select a separable or non-separable type of Hyatt Hy-Load, they are available in a wide range of sizes.

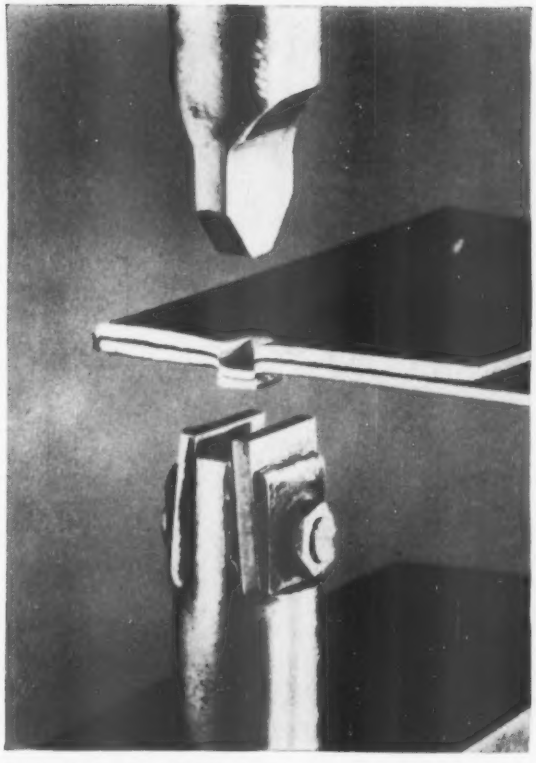
HYATT ROLLER BEARINGS



METALACING FASTENS metal to metal without the use of bolts, rivets, welds, or staples. Here's the top and bottom of 1/32 in.-thick galvanized sheet steel which has been Metalaced. Button-like fastenings are 1/16 inch wide, 3/16 inch long.



METALACING ACTION lets punch press button metal together with machine-gun rapidity. Patented punch and yieldable die can be attached easily to any ordinary punch press. You can get punches and dies in a variety of sizes.



SIMPLICITY OF METALACING and required equipment is shown in this cross-sectional close-up of punch and yieldable die.

Quick and Simple Way to Fasten Metal Sheets

Metalacing literally buttons metal to metal. This one-step operation offers a fast, simple, and economical way of fabricating sheetmetal parts.

Needs only a patented punch and yieldable die that can be attached to ordinary punch press. Strength and holding qualities of Metalacing compare favorably to conventional rivets, maker claims.

Can be used with any material that can be sheared, drawn, and upset. Punch-press action allows rapid successive fastenings.

Here's how it works. Punch descends, making parallel double incision in sheets. Metal between incisions is pushed downward and compressed against the anvil of the die. Force of this impact spreads the depressed metal laterally, making a permanent wedge under bottom sheet.

This process can be used by fabricators of sheetmetal in any form, from sheetmetal shops on up, the manufacturer says.

Crockatt Engineering Co., San Francisco, Calif.

WHAT'S NEW IN EQUIPMENT

. . . BRIEFED HERE FOR THE CONVENIENCE OF PLANT OPERATING MEN IS INDUSTRIAL PLANT EQUIPMENT NOW ON THE MARKET . . .

AUXILIARY EQUIPMENT 100
ELECTRICAL EQUIPMENT 109
MAINTENANCE TOOLS & SUPPLIES . 110
MATERIALS HANDLING 114
MEASURING & CONTROL 128
PAINTS & PROTECTIVE COATINGS. . 130
PLANT HOUSEKEEPING 134
SAFETY & PLANT PROTECTION . . . 136
VALVES & FITTINGS 138
MISCELLANEOUS 142

IN THE NEXT ISSUE . . . Some notes on important late items. More about them next month.

Scale detects and automatically rejects off-weight packages, using a 2-way conveyor belt. Adjustable tolerance settings establish overweight and underweight limitations.
Thayer Scale and Engineering Corp., E. Water St., Rockland, Mass.

Quick-opening door for pressure vessels can be opened or closed in a few seconds by expanding or contracting a split ring.
Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

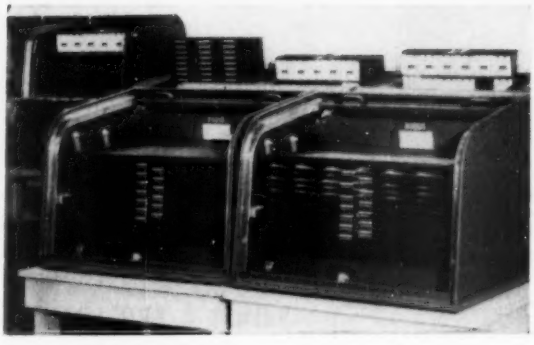
Flow measuring system measures the flow of liquids in gallons, then automatically converts this figure to pounds for the dial reading.
Gavco Corp., 540 E. 80th St., New York.

Automatic "Full to Empty" bracket indicator reveals whether or not carbon dioxide fire extinguishers are in proper operating condition. Called Silent Sentry.
National Equipment Distributors Co., 31 Milk St., Boston.

How McCaskey Gage and Tool Inspection Control has helped achieve

HIGH QUALITY CONTROL STANDARDS in RECORD TIME in NEW AVCO PLANT

AVCO'S Bridgeport-Lycoming Division achieved high standards of Quality Control in their new plant in a very few months. The simplicity and effectiveness of McCaskey Control procedures were readily adapted to their needs and have played an important part in their entire program.



The following facts concerning it are taken from "Maximum Tool-and-Gage Control" by Harry M. Baldwin, General Foreman, Quality Control, Bridgeport-Lycoming Division, AVCO Manufacturing Corporation, Stratford, Conn. The article appeared in a recent issue of "Factory Management and Maintenance."

Their objectives were first, to place control of gages, tools and instruments in the department responsible for inspection of them, centralizing records and inspection. Second, to use a minimum of forms and filing equipment.

Their accomplishments in less than a year include:

. . . effective centralized control. No gages or measuring instruments out of tolerance are being used.

. . . low initial outlay for McCaskey visible clip-spring wall boards and cabinets with capacity available for growth to twice the items now handled.

. . . minimum paperwork and, as a result, low unit cost of control.

. . . rapid accumulation of information on history record cards from gage tags and other sources for dependable guidance in planning future activities.

Similar results can be accomplished in your plant with McCaskey Controls. You can adapt them to your requirements, as AVCO and numerous others, large and small, have done.

Let us send you Mr. Baldwin's complete article and additional information on McCaskey Gage and Tool Control. Our Industrial Specialists are available to work with you. They are well qualified by practical experience to offer constructive suggestions. No obligation, of course.

MAIL COUPON FOR COMPLETE INFORMATION

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me the AVCO Bridgeport-Lycoming article reprinted from "Factory" and additional information on McCaskey Gage and Tool Control.

Name .....

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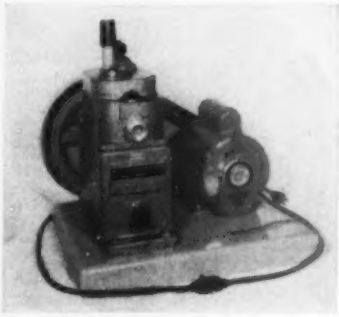
The McCaskey Register Co., Watford, England

WHAT'S NEW IN EQUIPMENT

Begins on page 100

AUXILIARY EQUIPMENT



Vapor Condensation Eliminated From Pump

Here is a solution to the problem of water-vapor condensation that confronts every mechanical pump user. This new rotary mechanical vacuum pump will handle condensible vapors, such as water vapor, without oil contamination or loss in pumping capacity.

Known as NRC Rotary Gas Ballast Pump, it prevents condensation of water vapor by maintaining the vapor pressure below the condensation point. A gas-ballast valve controls the condensation pressures of vapors passing through the pump within predetermined limits.

Especially useful in vacuum processes. Gas ballast can be effectively utilized in compound and combination units also.

Pumps are counterbalanced to eliminate operating noise. Resultant reduction in vibration increases life.

The pump is offered in single units with capacities ranging from 2 to 400 cfm., in compound units with capacities from 2 to 15 cfm., and in combination units with capacities from 30 to 400 cfm.

National Research Corp., 70 Memorial Dr., Cambridge, Mass.

Turn the page

WHICH POWER TYPE IS BEST FOR YOU?

. . . electric, gas, diesel or L. P. gas?

WHEN THE ANSWER IS *Electric* CLARK ELECTRICS ARE THE ANSWER *. . . Here's why:*

1 Better battery efficiency—users report *more work* per amp-hour with CLARK.

2 Greater stability—safer for load, safer for operator.

3 Faster acceleration, greater speed—gets more work done, covers more ground.

4 Safer, smoother stops—with CLARK's positive-controlled, reverse torque braking.

5 "Application-engineered"—for special requirements, CLARK provides custom engineering.

No two jobs are exactly alike, so there's no such thing as one "best" power type. Which type is best *for you?*—that's the important question. The only person who can give a really *unbiased* answer is one who knows them all, and knows where they fit.

That's your local CLARK Dealer. He carries electric, gas, diesel and L. P. gas units—and he's got no ax to grind for any one. His object is to provide the one that's best for you. For example, careful application analysis often proves that *electric* trucks are best for certain jobs because of these advantages.

★ **Economical operation on low-cost electric power**

★ **Long life, less maintenance; electrics have fewer, simpler moving parts**

★ **Smooth, vibration-free handling of fragile loads, less wear on truck**

★ **Quiet, clean operation**

Which power type is right for you? No matter what it is, you'll find it in the CLARK line of quality handling equipment. You'll always be right when you buy from CLARK.

CLARK ELECTRIC, GAS, DIESEL, L.P. GAS **FORK TRUCKS**
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Weld "difficult" steels with little or no pre-heat!

use P&H LOW-HYDROGEN ELECTRODES

P&H has the industry's most complete line of low-hydrogen electrodes — many custom-built to match the chemical analysis or heat-treating properties of a variety of alloy steels. Being hydrogen-free, these electrodes eliminate underbead cracking — little or no pre-heat is needed to get high-strength welds on problem steels, steel castings, nickel-alloy steels, chrome-moly steels, .40 carbon castings, high-hardenable steels, aircraft and similar steels. There are other important advantages, too — for example, lower cost, compared to stainless-steel electrodes formerly used on many jobs. Ask your P&H representative or distributor for all the facts. Or write for bulletin 5-26.

Chrome-moly header, typical of high-pressure, high-temperature applications.

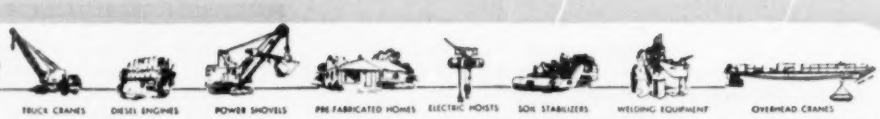
Low-alloy casting, typical of applications where physical properties must be matched.

Alloy gear rim, typical application matching heat-treating properties of parent metal.

Excavator body, typical of heavy sections welded with P&H Low-Hydrogen Electrodes.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4525 W. National Ave. • Milwaukee 46, Wisconsin

the P&H Line



2495

Heavy-Duty Electric Humidifier

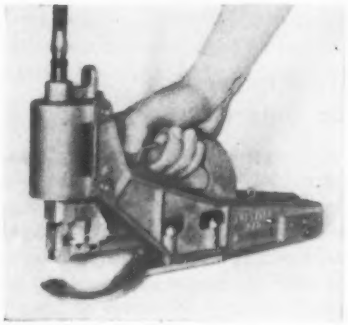
The Moisture Magnet requires no duct-work or air outlets for its installation. All that is needed is an electric outlet.

The manufacturer says the dehumidifier will retail for about half the cost of conventional types of equipment of equal capacity. Unit can be placed over a drain, or a pail may be used for water collection. Caster mountings for mobility are optional.

Two models are available, one with a 1-hp. compressor and the other with a 1½-hp. compressor. Compressor units are hermetically sealed, except in the d-c models. Can be used singly or in multiple units.

Remington Corp., Auburn, N. Y.

■



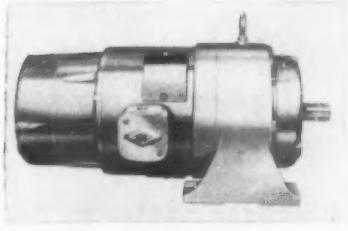
Portable Air-Driven Stapling Machine

Here is a machine developed especially for stapling shut large, odd-shaped cartons that are hard to move.

This heavy-duty unit, Model CAD, staples through tough solid fiber and corrugated board with ease, the manufacturer says. Operates on 80- to 90-lb. air pressure. Can drive up to 120 staples per minute.

Bostitch, 1008 Mechanic St., Westerly, R. I.

■



Fluid-Coupled Motor With Holding Brake

This motor is designed to provide fluid-cushioned starts and stops with the added advantage of a holding brake, the manufacturer says. The unit has a magnetic brake, motor with fluid coupling, second magnetic brake, and a gear reducer.

This motor can be effectively employed as a crane travel drive. Because of its smooth operation it reduces the usual pendulum-like motion of crane loads.

Reuland Electric Co., Alhambra, Calif.

■

ROOF VENTILATOR, especially designed for windowless plants has been marketed by the Chelsea Fan and Blower Co., Inc., 639 South Ave., Plainfield, N. J. Inconspicuous and weathertight, its primary use is as an exhaust fan. For belt or direct drive.

■

A DOUBLE-RIBBED V-BELT for variable-speed motors which reduces internal friction and allows greater flexibility has been marketed by U. S. Electrical Motors, Inc., Box 2058, Los Angeles 54. The new belt is constructed by building up layers of a synthetic rubber compound and then curing in a precision mold.

Turn the page

P&H

WELDING HEADQUARTERS

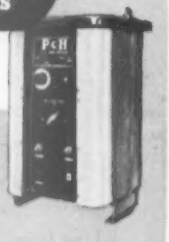
—that's where you find cost-cutting answers to welding problems

P&H AC WELDER

Any heat at your fingertips — right at the work — with Dial-lectric Instantaneous Remote Control. Sizes up to 625 amps., NEMA rated. Connectable to 220 and 440 volts.

P&H WELDING TWINS

P&H DC RECTIFIER WELDER



Right now —at the work — fingertip Dial-lectric Control gives you the heat you need. Three sizes, 200,. 300, and 500 amps., NEMA rated.

P&H WN-301 *Engine-Driven* DC ARC WELDER

It's portable—weld anywhere, anytime. Dial-lectric Control gives you fingertip heat control at the work — for faster, better welding. Runs at only 1750 rpm. Welding service range, 60-375 amps., NEMA rated.

P&H POSITIONERS

One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

Ask your P&H representative or distributor for complete information, or write for free bulletins.

P&H WELDING DIVISION

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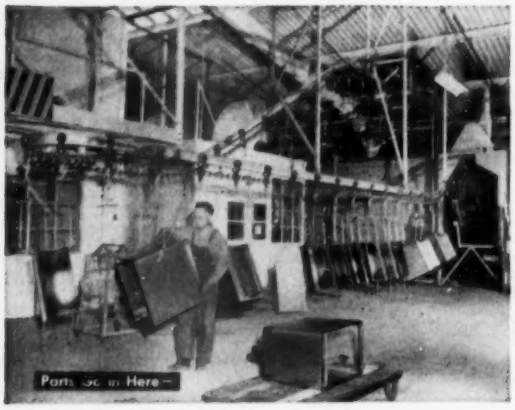
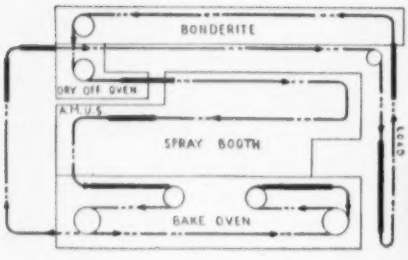
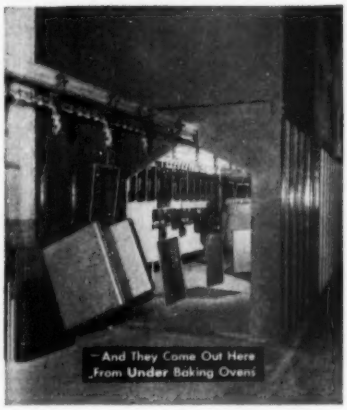
Double Decker



Making the MOST of LIMITED SPACE for Finishing Office Furniture





A manufacturer of office furniture had a problem. He wanted a complete finishing unit in his plant—from Bonderizing • to Drying Ovens • to Spray Booths • to Baking Ovens • **BUT *he didn't have much space.*** Peters-Dalton Engineers studied his plant—made the layout shown above—sent his products through a system that ***doubled*** his floor space. Overhead installations were laid out and made of the Air-Makeup System and Baking Ovens. The finishing line was sent ***around, over*** and ***under.*** Result: A compact finishing system, efficient to the Nth degree—yet utilizing plant *cubic* footage where before only *square* footage seemed available. **Write For Catalog.**

Hydro-Whirl Paint Spray Booths ***Industrial Washing Equipment***

Drying and Baking Ovens ***Hydro-Whirl Dust Collecting Systems***

Peters-Dalton INC.
17918 Ryan Road • Detroit 12, Michigan

NEW AUXILIARY EQUIPMENT

Begins on page 100

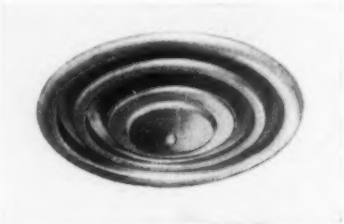
Communications Consolette

This single-channel desk-top unit can provide intra-plant communications in 20 rooms or areas. It is possible to extend this coverage to 60 rooms if so desired.

Designed to provide recorded programs, radio programs, and local-origin announcements. Can be set to operate in only selected areas as well as over the whole network. A separate intercommunications channel is optional.

Radio Corp. of America, Camden, N. J.

■



Air Diffuser for Unit Heaters

You can now supply air from down-blow unit heaters and provide for its return through the same device. This diffuser introduces air into the room through the inner orifice and permits it to return through the outer orifice.

Is especially effective in hard-to-heat spots, the maker says. Available with supply necks of 11 to 22 inches diameter.

Conner Engineering Corp., Shelter Rock Lane, Danbury, Conn.

Turn the page

Obsolescent, if!

These strong and able hands work a constantly shorter week at a steadily rising wage. Labor is producing less and less at a higher unit cost, IF . . .

. . . IF its productivity is measured in terms of output on yesterday's machine tools!

But *why* those old machines? Why—with management never more conscious of cost and the need to reduce cost—with never less likelihood for reducing cost in the areas of wages or taxes? Why—when greater productivity through new and improved machine tools offers the obvious, and only, way out?

Why again, with machine tools like today's Monarch lathes on the market? We can point, at random, to new Monarch installations that have effected a first year labor saving amounting to 49½% of lathe costs—or a tooling reduction of over $4,000.00—or a *two-lathe* output equal to that of four *less modern* machines.

You may think the answer is that your equipment is not yet fully depreciated and may not be for several years. There are taxes and higher replacement costs to consider, too.

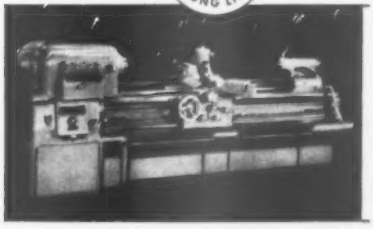
But we all have partial reserves and we all have earnings. And dollars don't maintain output. Machines do! Those dollars now available for machines that will balance off the labor factor with higher output are reserves for *productivity*. Invest them for that—now. . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES



Monarch Series 60 with Air-Gage Tracer—for quick, automatic duplication of contours. Monarch has built fine lathes for production line and toolroom since 1909—has pioneered the use of tracer controls since 1930.

5 Great Attractions with... Behr-cat® Masking Tape

BALANCED STRENGTH

BEHR-CAT Tape is nicely balanced between lengthwise tensile strength and crosswise tear facility. It's strong enough to flex around contours, yet has stretch enough to lie flat.

CLEANER STRIPPING

BEHR-CAT Tape strips clean . . . leaves no deposit . . . gives you no worry about spoiling a good job. Its adhesive is firmly anchored, is stable, and withstands high temperatures.

MAXIMUM FLEXIBILITY

BEHR-CAT Tape has plenty of "give" on any irregular surface. It shapes to any contour . . . flexes around sharp curves . . . hugs difficult shapes as readily as flats.

EASIER HANDLING

BEHR-CAT Tape handles faster and easier . . . it's thin and stretches uniformly without curl-back . . . goes on with a pass of the finger . . . stays put till you strip it . . . thinness prevents paint build-up.

CORRECT ADHESION

BEHR-CAT Tape has just the right degree of tackiness. It sticks tightly under stress without creeping . . . prevents paint seepage . . . grips well on undercoats, lacquers, enamels, bare metals, etc.

Try a sample roll

"BARNEY" says you haven't seen tops in color separation till you've tried BEHR-CAT. Try a sample roll now — write Behr-Manning Corp., Troy, N. Y. Address Dept. FM-5.

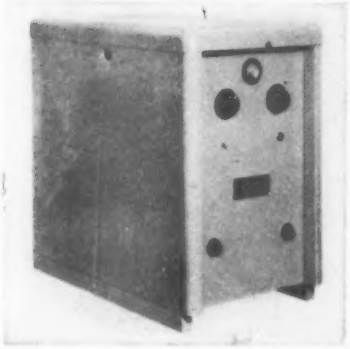
In Canada: Behr-Manning (Canada) Ltd., Brantford.

For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

BEHR-MANNING® CORPORATION
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

ELECTRICAL EQUIPMENT



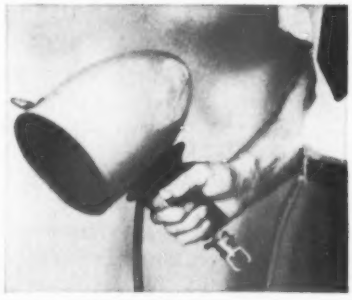
Welding Power Source to Keep Voltage Constant

Regardless of fluctuations in arc length, this d-c power source automatically maintains the desired pre-set arc voltage, the manufacturer says. The power supply was designed for easy installation, operation, and maintenance.

Available in 500 and 1000 amp. continuous-duty rated models for submerged arc and inert gas welding. Units operate on either 240 or 480 volts, 3-phase, 60-cycle a-c.

Glenn Co., 3134 E. 10th St., Oakland 1, Calif.

■



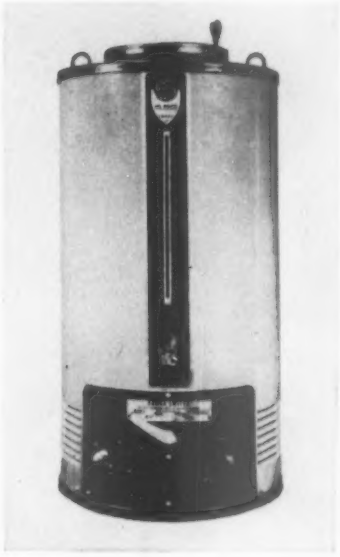
Portable Multi-Purpose Inspection Lamp

Mineralight is a new portable ultra-violet lamp for analysis and inspection operations. Radiation from this lamp is non-injurious to the eyes and skin, the maker says.

Can be used to detect oil leaks in machinery. Operates on a 110-volt a-c current and can throw a directional beam up to 30 feet.

Ultra-Violet Products, Inc., 145 Pasadena Ave., S. Pasadena, Calif.

■



Single-Phase A-C Welding Transformer

The new transformer can be used with various sized electrodes for repair and maintenance work. It has a 60% duty cycle and provides a current range from 40 to 500 amps.

The advantages of the new unit are longer coil life due to the use of silicone insulation and stepless current control that permits accurate adjustment, the manufacturer claims.

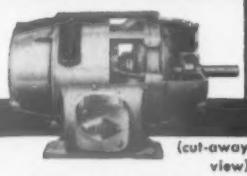
General Electric Co., Schenectady 5, N. Y.

■

BATTERY WITH MORE CAPACITY, SAME VOLUME has been developed by The Electric Storage Battery Co., 1950 Allegheny Ave., Philadelphia. The new battery has many plastic parts which add to the life of the unit.

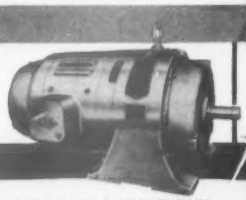
Turn the page

DO THESE NEW
Reuland motors
FIT INTO YOUR PICTURE?



(cut-away view)

FLUID-SHAFT MOTOR
Provides smooth acceleration of heavy loads. More compact than separate motor and fluid coupling. *Perfect alignment!* Thousands in use on cranes, mixers, centrifugals, etc.

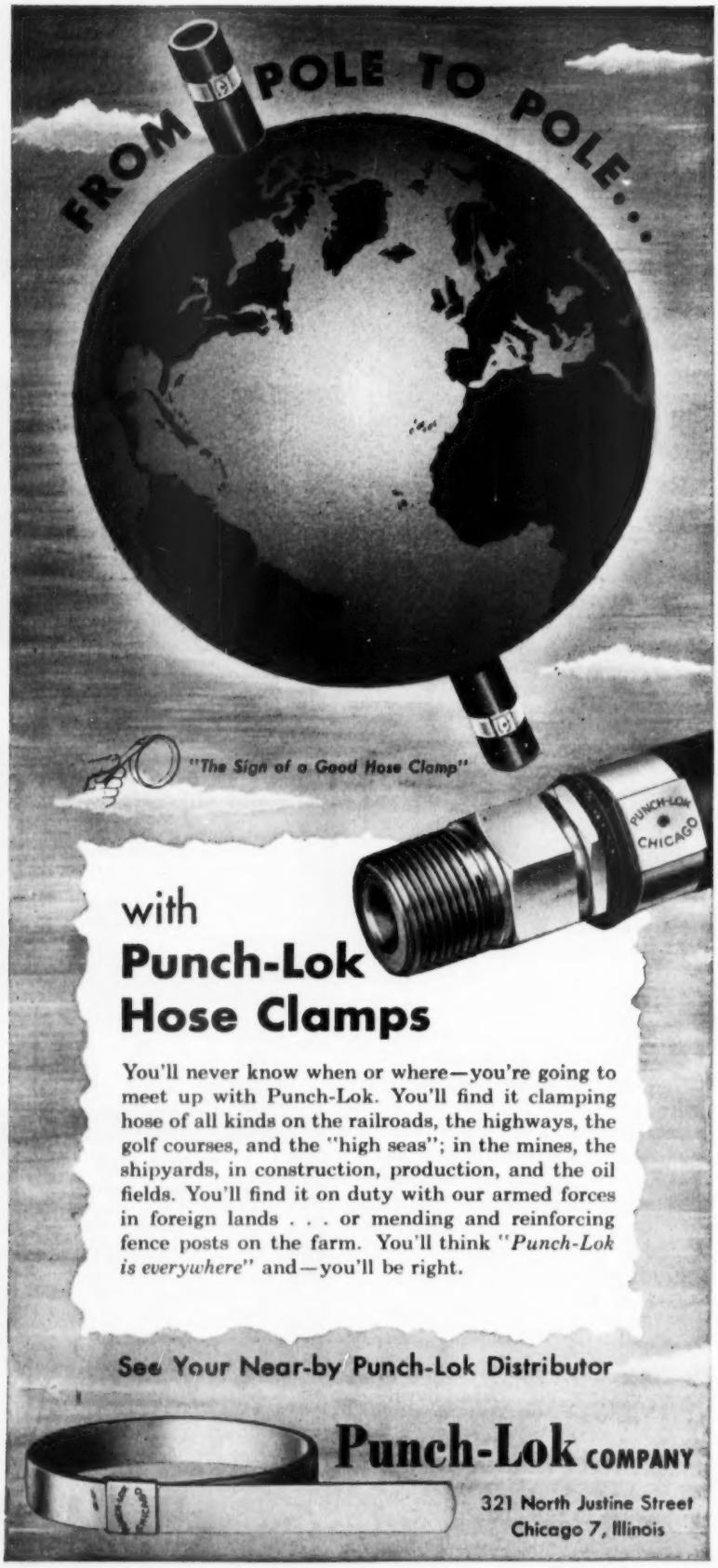


FLUID-SHAFT MOTOREDUCER
This Fluid-Shaft motor and gear reducer combination converts the motor's conventional high speed into a slow speed, smooth starting, compact unit. Ideal for car pullers, conveyors, dryers, etc.

MAGNETIC BRAKE
The only brake that permits the use of TWO output shafts per motor. *When desired, the motor shaft can be extended right through!* Only 6 major parts...no levers or linkage... self adjusting . . . half usual length!

Write for new engineering folder on these and other *exclusive* Reuland Products . . . *industrial units designed to fill the needs of the nation's leading equipment manufacturers!*

REULAND ELECTRIC COMPANY
Alhambra, Calif. Representatives in all principal cities
FIRST IN QUALITY . . . FIRST IN DESIGN


FROM POLE TO POLE...
"The Sign of a Good Hose Clamp"
PUNCH-LOK
CHICAGO
with
Punch-Lok
Hose Clamps
You'll never know when or where—you're going to meet up with Punch-Lok. You'll find it clamping hose of all kinds on the railroads, the highways, the golf courses, and the "high seas"; in the mines, the shipyards, in construction, production, and the oil fields. You'll find it on duty with our armed forces in foreign lands . . . or mending and reinforcing fence posts on the farm. You'll think "Punch-Lok is everywhere" and—you'll be right.
See Your Near-by Punch-Lok Distributor
Punch-Lok COMPANY
321 North Justine Street
Chicago 7, Illinois

Begins on page 100

MAINTENANCE TOOLS & SUPPLIES

Plate and Sheet Working Machine

Designed to simplify maintenance tasks with a few tools and attachments. This machine will do beading, straight cutting, folding, joggling, circular cutting, slot cutting, and irregular or free-hand cutting.

Tools can be changed easily and quickly, the maker says. Mechanism is enclosed and operated in oil bath. Models offered with cutting capacities from ⅛ inch to 5/16 inch and throats from 28½ to 49 inches. Motors for 220 or 440 volts, 60 cycle, 3 phase.

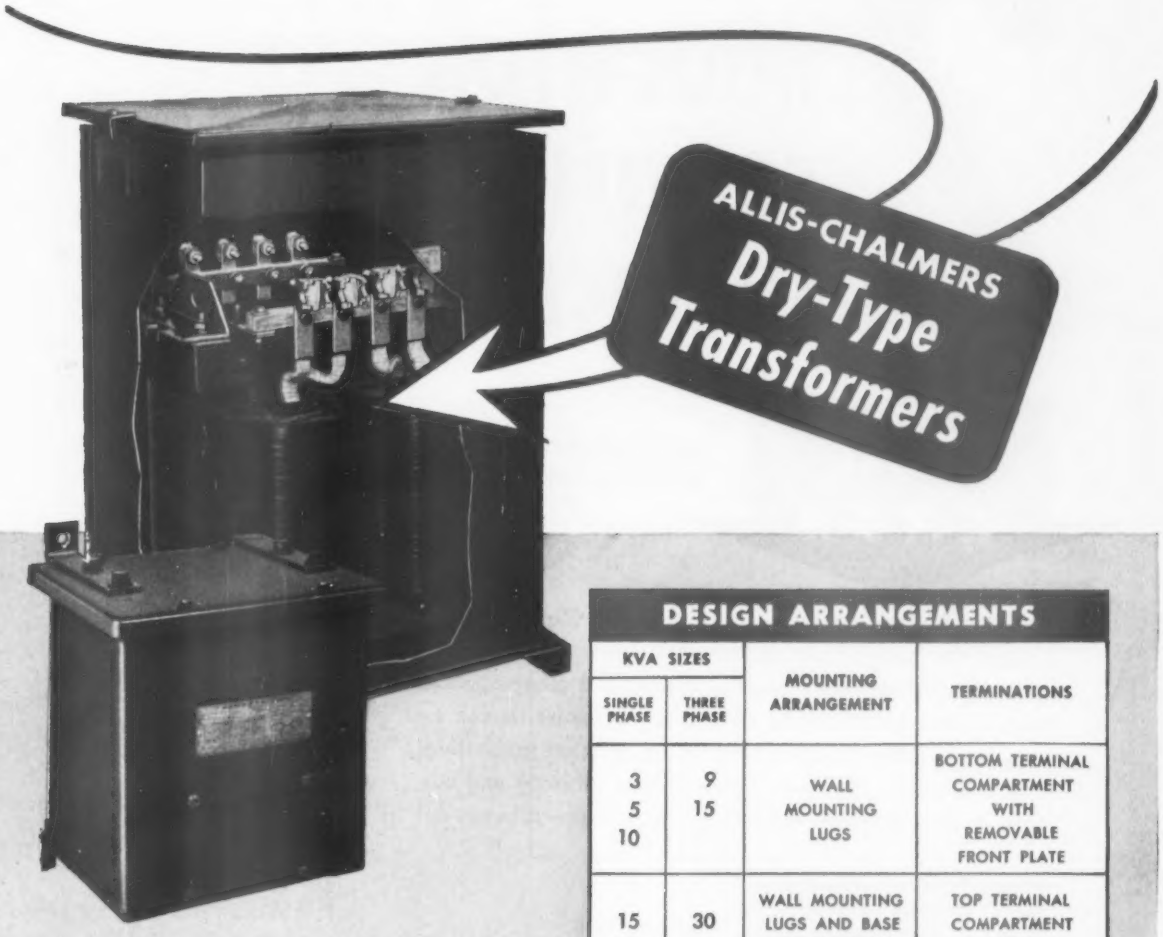
Eric S. Johnson Co., 230 E. Ohio St., Chicago 11.

■

AN INSULATION FASTENER with positive-locking action has been marketed by the Lexington Supply Co., 4815 Lexington Ave., Cleveland 3. Designed for use with rigid and semi-rigid insulations up to 2 inches thick and steel sheet up to 18 gage. Called Lexsuco Clips. Made of a hardened steel alloy, and can be driven with an ordinary mallet.

Turn the page

EASY TO INSTALL!



- **Convenient handling** . . . improved materials and compact design result in a small, lightweight transformer that can be easily handled.
- **Plenty of work space** . . . big, roomy wiring compartment for connecting system cables. Conduit knockouts are provided.
- **Fast hookup** . . . solderless clamp-type connectors that reduce hookup time to minutes are available on sizes 15 to 50 kva inclusive, single phase; sizes 45 to 112½ kva inclusive, three phase.

DESIGN ARRANGEMENTS

KVA SIZES		MOUNTING ARRANGEMENT	TERMINATIONS
SINGLE PHASE	THREE PHASE		
3 5 10	9 15	WALL MOUNTING LUGS	BOTTOM TERMINAL COMPARTMENT WITH REMOVABLE FRONT PLATE
15 25	30	WALL MOUNTING LUGS AND BASE FOR PLATFORM MOUNTING	TOP TERMINAL COMPARTMENT WITH REMOVABLE COVER
37½ 50 75 100 167	75 112½ 150 225 300	BASE FOR PLATFORM MOUNTING	TOP TERMINAL COMPARTMENT WITH REMOVABLE COVER

Get these benefits

All-welded case gives you complete protection. No additional enclosures or vaults are required. Surface finish is resistant to corrosion by acids, vapors, or moisture. Surface is Spra-Bonderized. Three coats of alkyd-resinous paint are then separately baked on.

Let Allis-Chalmers Class "B" dry-type transformers furnish full voltage at the load. To get complete information, contact your nearby Allis-Chalmers district office or write — Allis-Chalmers, Milwaukee 1, Wis.

A-4033

ALLIS-CHALMERS

2 NEW HOUGHTON FORTIFIED LUBRICANTS

TENAC L, M & H

HIGHLY ADHESIVE OPEN GEAR AND CABLE LUBRICANT

This new lubricant is made in three grades (light, medium, heavy) for heavy duty service for open gears, cables, presses, shovels, hoists, shears, cranes and other applications where conditions do not permit enclosure. It can be applied by spray, brush, swab, or dip, without preheating. Resists moisture. Has high film strength, lubricity and oiliness. And as its name implies — it is tenacious — it hangs on!

COSMOLUBE 101 & 102

NON-MELTING, NON-SEPARATING GREASE

This is a new grease that has no softening or melting point! It is a bentone bodied grease, ideal for conveyors operating at elevated temperatures, pumps handling hot liquids, bearings on steel mill and foundry equipment and heavy duty mining and contracting equipment. It is water resistant, oxidation inhibited, will not separate and can be used in conventional greasing equipment.

. . . products of

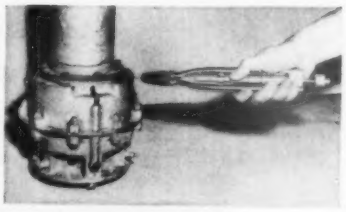
E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Write for data sheets on these two newest Houghton Fortified Lubricants. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 110



Wire-Twisting Tool

Here is a handy little tool for your maintenance department. The manufacturer claims this tool can twist two wire ends together three times faster than the old hand method.

It is actually three tools in one—pliers, wire cutter, and twister. All you do to twist wire ends is place them in the pliers, lock the handles by slipping down the center rod, and then pull the knob on the end of the tool. The knob is attached to a spiral rod which when pulled out causes the entire tool to spin.

Ralph C. Robinson Co., Box 494, N. Sacramento 15, Calif.

■

Extra Capacity Grease Guns

These new guns are designed to hold 40% to 100% more lubricant than regular models, the maker claims. Capacity ranges from 21 to 32 ounces, developing pressures up to 10,000 pounds. The guns are of the lever-type and are equipped with a hydraulic coupler extension.

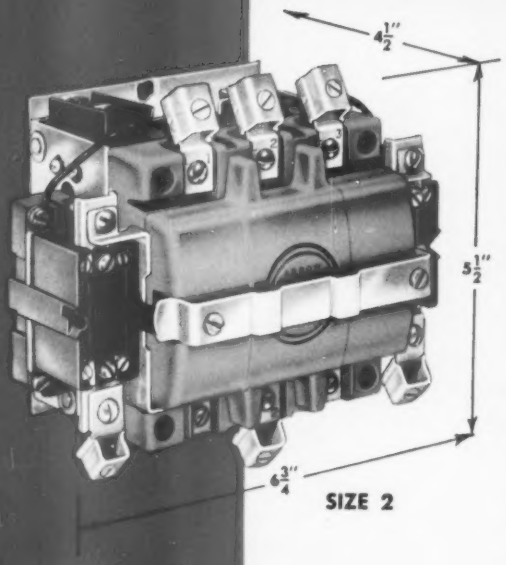
Lincoln Engineering Co., Natural Bridge Ave., St. Louis 20, Mo.

■

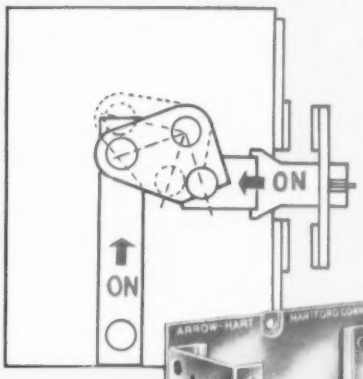
SIMPLE AIR-CONTROLLED VISE with both the air cylinder and stationary jaw on the same side of the workpiece is being produced by The Wilson Bohannan Co., Marion, Ohio. Unit is 12 inches long and has a jaw opening of 2 inches. For special applications jaw opening can be increased to 6 inches.

Turn the page

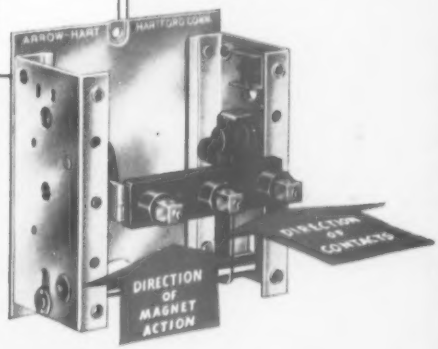
HERE'S THE **BIG STORY** BEHIND
ARROW-HART'S DEVELOPMENT
OF THE TYPE "RA"
MOTOR CONTROL DESIGN



SIZE 2



Balanced mechanism features knee-action bell-crank fulcrum design to transfer action from vertical to horizontal plane. Action multiplies leverage — increases contact pressure.



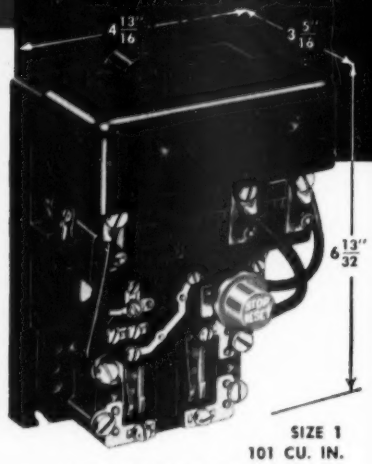
JUST ½ THE SIZE

ARROW AH HART

A REVOLUTIONARY DESIGN THOROUGHLY TESTED AND PROVED TO PROVIDE SUPERIOR OPERATING PERFORMANCE IN HALF THE SPACE • WITH LESS WEIGHT

PROGRESS IN DESIGN MAKES THE **BIG** DIFFERENCE

HERE ARE THE FACTS OF THE ARROW·HART ADVANCEMENT OF *Magnetic* MOTOR CONTROLS



SIZE 1
101 CU. IN.

ARROW-HART'S 1930
CLAPPER TYPE STARTER

COMPACTNESS
Much wasted space; contacts over magnet . . . overload relays below.

UNDERVOLTAGE RELEASE
POOR — dependent on gravity working through an inefficient linkage angle.

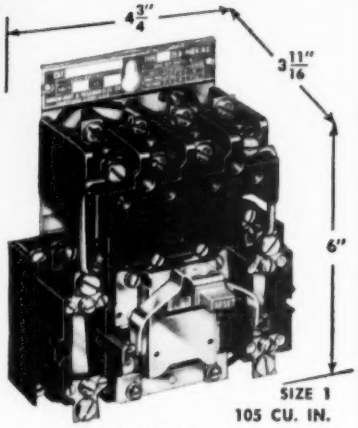
CONTACTS
Single break type.

AUXILIARY ELECTRICAL INTERLOCKS
Available, but could not be added conveniently.

CONTACT ALIGNMENT
No positive guidance, no sure alignment.

WIRING
"Scrambled Wiring" with load terminal on line side and crossing circuits. Difficult to wire and lacking the safety factor of circuit separation.

ARC SUPPRESSION
FAIR but lacking complete separation of arcing chambers. Hood and base of Bakelite — best material available *then*.



SIZE 1
105 CU. IN.

ARROW-HART'S 1940
DIRECT-ACTING SOLENOID TYPE STARTER

COMPACTNESS
Some improvement, but still far from ideal.

UNDERVOLTAGE RELEASE
Still entirely dependent on gravity, but now more efficiently applied.

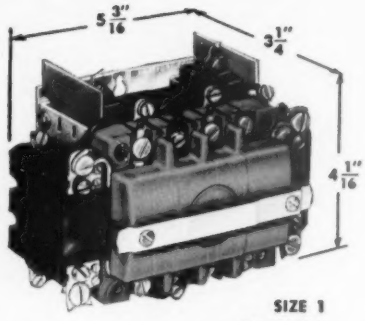
CONTACTS
Double break type.

AUXILIARY ELECTRICAL INTERLOCKS
Available, but could not be added conveniently.

CONTACT ALIGNMENT
No positive guidance, no sure alignment.

WIRING
"Scrambled Wiring" with load terminal on line side and crossing circuits. Difficult to wire and lacking the safety factor of circuit separation.

ARC SUPPRESSION
FAIR but lacking complete separation of arcing chambers. Hood and base of Bakelite — best material available *then*.



SIZE 1
66 CU. IN.

AND IN 1950
THE EXCLUSIVE ARROW-HART "RIGHT ANGLE" DESIGN

JUST 1/2 the SIZE and WEIGHT of any other control on the market.

UNDERVOLTAGE RELEASE
Positive and independent of gravity. Able to operate properly in any position — even upside down.

CONTACTS
Double break type PLUS greater accessibility for easy inspection or replacement.

AUXILIARY ELECTRICAL INTERLOCKS
Easily and conveniently added to provide added utility. Available N. O., N. C. and N. O. — N. C.

CONTACT ALIGNMENT
Contact movement is positively guided through its entire travel. Exact alignment is assured at all times.

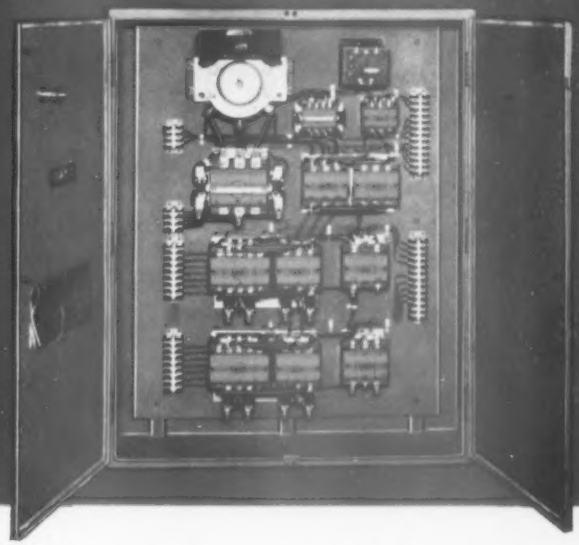
WIRING
In-built STRAIGHT-THRU WIRING without the use of bus-bars. Fast and easy to wire; circuits safely separated.

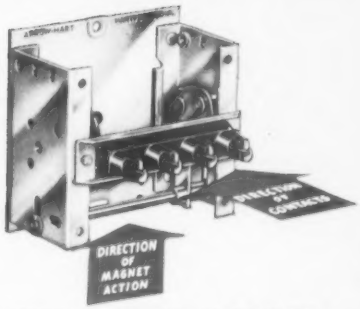
ARC SUPPRESSION
EXCELLENT — Individual arcing chambers completely isolated. Hood and base of alkyd plastic that resists arcing and tracking more than 50% better than next best material.

YOUR ELECTRICALLY OPERATED EQUIPMENT *Demands* MODERN MOTOR CONTROLS

ARROW AH HART

"RIGHT ANGLE" DESIGN *Motor Control Line* IS THE MOST ADVANCED LINE AVAILABLE ANYWHERE





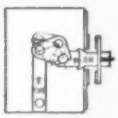
"RA" PRINCIPLE ACCOUNTS FOR SMALL SIZE

PLUS SUPERIOR PERFORMANCE

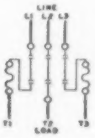
POSITIVE RELEASE ACTION IN ANY POSITION

RUGGED CONTACTS

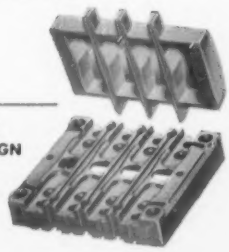
AUXILIARY ELECTRICAL INTERLOCK



GUIDED CONTACT TRAVEL



SIMPLE TO WIRE EASY TO TRACE



TONGUE AND GROOVE DESIGN

INSIST ON MOTOR CONTROLS THAT HAVE KEPT PACE WITH OTHER INDUSTRIAL DEVELOPMENTS

In a recent 10 year period, lathes, for example, were improved in 43 separate categories, many of which resulted in time savings of 200 to 300% for the performance of a specific operation. Don't handicap your machines and equipment with 1930 controls. Specify Arrow-Hart "RA" Controls and be assured of full rated performance.

THE "RIGHT ANGLE" OPERATING MECHANISM, an exclusive Arrow-Hart feature, represents the first real advance in motor control design since the introduction of the original solenoid type. This revolutionary new concept makes it possible to build superior performance and added working advantages into a control just ½ the size and weight of any other now on the market. The time-tested bellcrank principle is utilized to produce a mechanical advantage that enables a small, compact magnet to outperform the old fashioned, direct-acting type. Action is transferred from a vertical to a horizontal plane — less weight is wastefully lifted against gravity. Operating efficiency, dependability and service life are greatly increased. Other important refinements such as Straight-Thru Wiring, guided parallel closure of contacts for superior alignment, and easily attached Auxiliary Electrical Interlocks are made possible by the space-saving simplicity of this design.

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INDUSTRIAL CONTROL DIVISION
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103 Hawthorn St., Hartford 6, Conn., U.S.A.

ARROW AH HART

HERE'S IMPORTANT INFORMATION

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and EVERY OTHER USER OF
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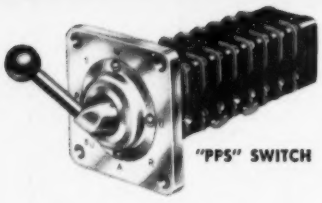
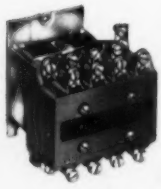
Here is the ALL-NEW Arrow-Hart Motor Control Catalog with full information on the entire A-H line. All of the controls shown below—and many more types—are included. General descriptions and application notices are supplemented by complete engineering data including ratings, weights and dimensions, and wiring diagrams. Additional sections will be issued to cover all new models or modifications as they are made available. A handy ordering sheet and price supplement accessorizes the catalog.

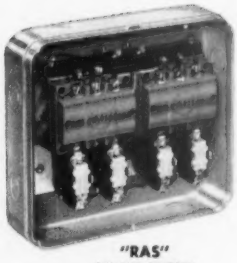
Whatever your requirement, there is an Arrow-Hart motor control complete with auxiliary equipment designed and built to do the job — and do it better. It's easy to find the right unit to do YOUR job in the A-H Catalog. Send for your copy today.


"PPS" SWITCH

PUSH BUTTON CONTROLS

"NF" MANUAL STARTER


"OO" CONTACTOR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Please send my free copy of the catalog, "INDUSTRIAL MOTOR CONTROLS"; I am particularly interested in the following type(s) of equipment:_____

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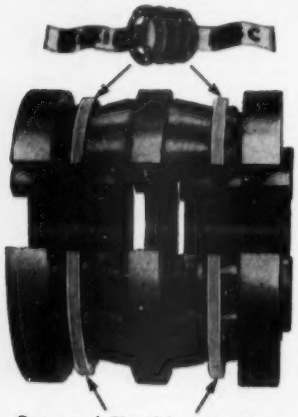
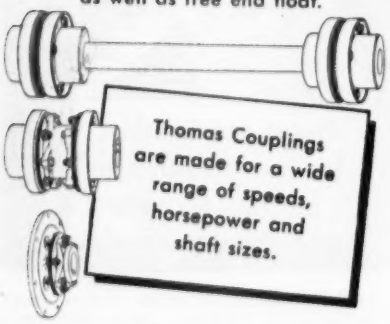
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



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ALL PARTS ARE SOLIDLY BOLTED TOGETHER

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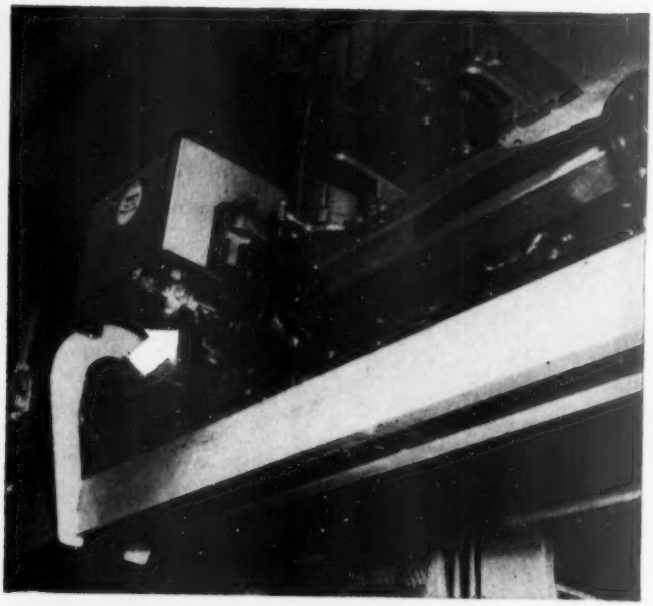
MATERIALS HANDLING



Automatic Conveyor Trolley Wheel Lubricator

You can now save valuable man-hours formerly used in hand lubrication of conveyor trolley wheels with this automatic lubricator. In addition, by lubricating the wheels while the conveyor is in motion, downtime is reduced.

The lubricator is designed to automatically deposit required amount of lubricant on both sides of each trolley wheel. As the wheel reaches the lubrication point of the track (arrow in above picture), a coupler clamps the lubricant fitting to its hub. After the lubricant has been delivered, the coupler instantly disengages and waits for the next wheel. When the entire conveyor has been adequately lubricated, the lubricator can be switched off.

Spacing of the conveyor wheels is no problem. They can be irregularly spaced—yards apart, or as close as 8 inches, center to center. The lubricator can be readily adapted to wheels of any diameter, the manufacturer says.

Either oil or grease can be employed as the lubricant. With grease it is necessary to apply 60-lb. pressure to inject it into the wheel bearings. Oil flows by gravity.

Attached to a 40-in I-beam section, it can be fitted into the conveyor track. It only needs to be connected to the air supply and a 115-volt, 60-cycle electrical outlet. System requires 22 inches headroom.

Available as a packaged unit, the lubricant reservoir capacity is 4 pounds of grease or 2 quarts of oil.

Alemite Div., Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago 14.

Turn the page

COARSE
FINE
EXTRA FINE
Note special tooth arrangement
in this greatly magnified section.
here's why Heller NUCUT
wavy teeth* save
half your work
★ Scientific tooth spacing provides double-action filing—cuts fast and deep, finishes smooth and scratch-free. This same feature eliminates chattering and makes possible a more durable, longer lasting file. Order from your local distributor.
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1. Extra insulation in stator slots and between phases.
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WRITE TODAY FOR NEW ILLUSTRATED CATALOGUE NO. 565
Also a complete line of Direct Current motors and generators
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MATERIALS HANDLING EQUIPMENT

Begins on page 114

Tiering Truck for Narrow Aisles

With this truck you can use narrower aisles in your warehouse. The forks of this electric tiering truck reach right out to pick up and deposit the load. The forks will extend 24 inches and return in a few seconds' time, the maker claims.

A 6-ft. aisle is all that is needed for the truck to right-angle-tier loads. This is due to its short-length fork action and off-set drive wheel, with 200-deg. turning arc.

Called Reach-Fork, it is ideal for loading and unloading motor trucks and boxcars. Will handle pallets of any size without changes in the truck equipment.

Can be operated safely on low-capacity elevators and floors because of lightweight design. Has 10x5 load wheels and uses standard 12-volt battery that slides into position on built-in rollers. Capacity is 2000 pounds.

The Raymond Corp., 32 Madison St., Greene, N. Y.

■

ADJUSTABLE PALLET RACK with heavy-gage uprights that are notched every 6 inches is being made by Berger Manufacturing Div., 1038 Belden Ave. N. E., Canton, Ohio. Manufactured to customer's requirements with maximum dimensions 60x60 and 120 inches high. Load limit up to 3000 pounds per shelf. Shelves can be relocated by one man without tools.

Turn the page

just the right VERTICAL drive for every job!

On agitator tanks—on mixing vats—on overhead conveyors—on beaters—wherever the application calls for a vertical drive, you will find just the right one for your needs in the wide range of drives available from Foote Bros. Capacities up to 264 h.p. Ratios from 4⅛ to 1 up to 4118 to 1.

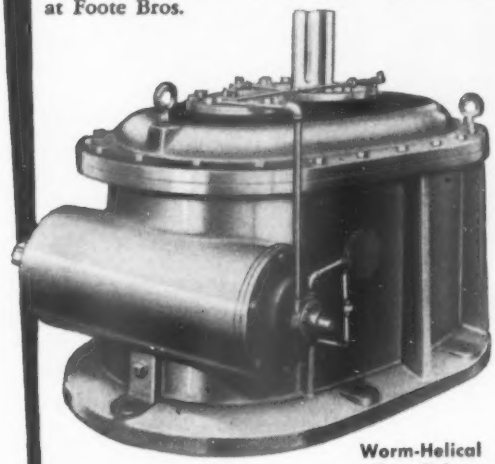
Line-O-Power Drives—compact, efficient drives with Duti-Rated Gears available in standard models or in extended shaft design where long unsupported output shafts are encountered.

Foote Bros.-Louis Allis Gearmotors in vertical design.

Hygrade Worm Gear Drives standard design or Hytop design for long, unsupported output shaft extensions.

Worm-Helical Gear Drives. Big, husky units of worm and helical gear design.

Whatever your requirements in vertical drives, you will find just the one to suit your needs at Foote Bros.



Worm-Helical Gear Drive

Foote Bros.-Louis Allis Gearmotor Extended Shaft

Hygrade Worm Gear Drive Standard Shaft

Hygrade Worm Gear Drive Extended Shaft

Line-O-Power Drive Standard Shaft

Line-O-Power Drive Extended Shaft

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Name.....

Company.....

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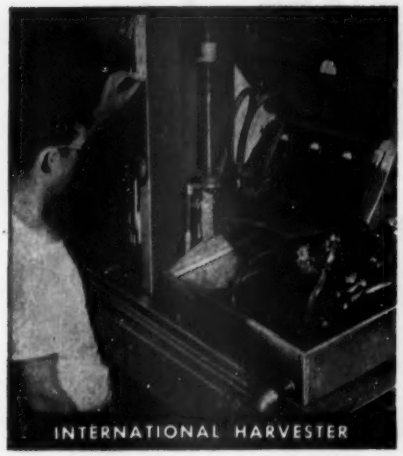
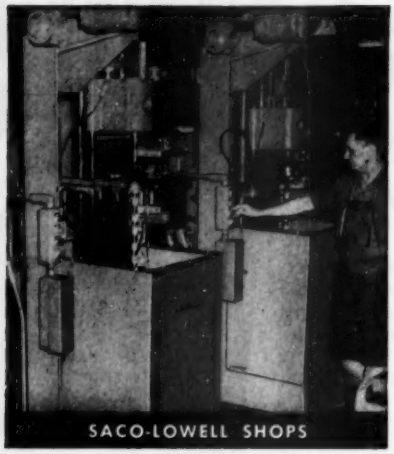
From Tractors to Textiles



INTERNATIONAL HARVESTER



SACO-LOWELL SHOPS

from Presses to Planes

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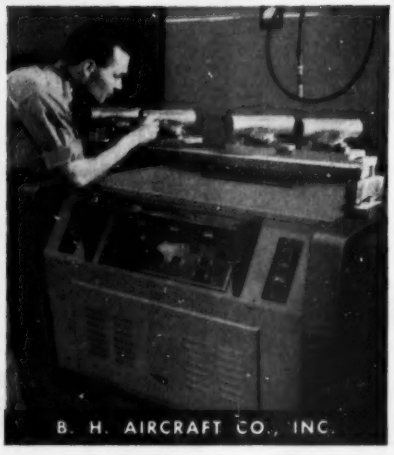

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MATERIALS HANDLING EQUIPMENT

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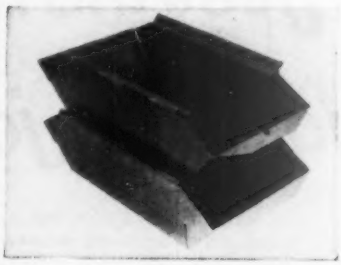

Versatile Tote Boxes

These units can be nested, stacked crossways, or stacked parallel. The different positions are made possible by a hinged rail that is attached to two parallel sides of the boxes.

When you wish to stack these units parallel, the rail is swung to the inside of the box to provide support for the next layer. When the boxes are not in use and nesting is advisable to conserve space, the rail is swung to the outside of the box.

Called RANtote 877, box weighs 10 pounds but is capable of withstanding 1200 pounds of pressure without distortion, the manufacturer claims.

Randolph Metal Products Co., 3843 W. 43rd St., Chicago.

■

Free-Rolling Crane Has Swiveling-End Trucks

This manual crane was designed to insure proper alignment with the track. The swivel-type end trucks on which the girder bridge is mounted assure this feature. They also adjust to irregularities in the runway.

Known as the Flexo-Crane, it is available in capacities up to 1 ton. The light weight of the crane makes for easy handling.

Abell-Howe Co., 53 W. Jackson Blvd., Chicago 4.

Turn the page

Supreme in its field, this mobile monster moved from drawing board to proving ground in record breaking time. Once there, it proceeded to shatter performance records too . . . a real tribute to the superb engineering and production power of the Army Ordnance Corps and the Chrysler Corporation.

BAY STATE abrasive products, among others, were used to accomplish this feat. In particular, BAYFLEX reinforced disc-wheels were used by many Chrysler suppliers for grinding "miles" of tank-hull welds.

BAY STATE is proud to play its part in this modern miracle of stepped-up production. We salute the Patton 48 and the forward-moving program of Army Ordnance and Chrysler.

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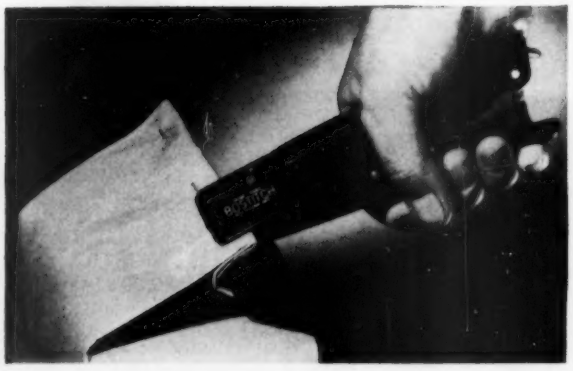
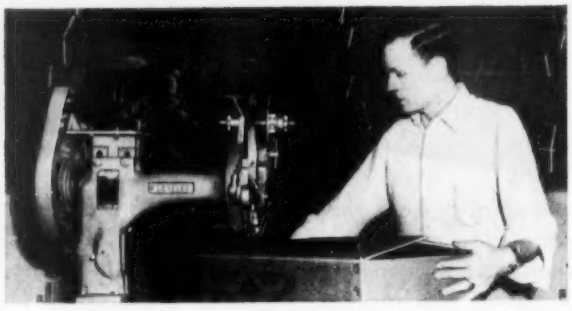


ICE IN THE BAG. Yes, you can buy ice in sturdy paper bags. The bags, in this case, were once closed with twists of wire. But the local Bostitch economy man showed the ice manufacturer how much better looking, stronger, and more salable staple-sealed bags are. Now all ice plants in the chain use Bostitch stapling pliers to close ice bags.

BAGGING ICE... OR BOXING A FOREST...

BOSTITCH DOES IT BETTER AND FASTER!

YOUR CHRISTMAS TREE arrives in a big corrugated container when you order it from this famous Northwest packer. The bottoms of the boxes are closed with a Bostitch wire stitcher. The Bostitch method saves packing time, cuts material costs, eliminates losses due to moisture-loosened seals. Boxes can be made up as needed —no storage problem. Bostitch could save time and money in *your* shipping room, too.



FREE BULLETIN *describes 30 of the 800 Bostitch models most often used for wrapping, packing and container closing. Send coupon.*

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Please send me a free copy of your bulletin on Bostitch stapling machines for shipping-room use.

I am particularly interested in a better and faster method for:

☐ Assembling cartons ☐ Repairing cartons for re-use
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☐ Top-sealing ☐ Sealing corrugated wrappers
☐ Covering barrels ☐ Tagging

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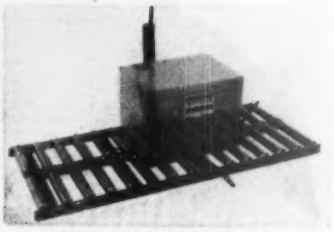
fastens it better, AND FASTER, with wire

ALL TYPES OF MACHINES FOR APPLYING STAPLES
ALL TYPES OF STAPLES APPLIED BY MACHINES

MATERIALS HANDLING EQUIPMENT

Begins on page 114



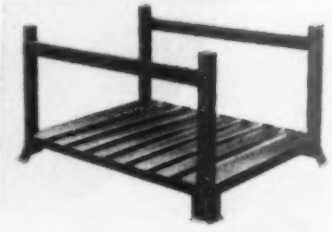
Conveyor Simplifies Banding Operation

Banding operations are made easier by built-in channels in this conveyor. Both of the channels have deflectors so the operator doesn't have to fumble for the end of the metal band.

One channel runs lengthwise and the other runs across the conveyor. Can be fitted into any standard conveyor line, the maker says. Available in standard conveyor widths or can be made for customer's special requirements.

Metzgar Co., 438 Douglas St. N. W., Grand Rapids 4.

■



Skid-Type Handling Unit

The Phil-Tier can be used effectively for stacking and transporting pipe, angle iron, structural steel, and long items. The skid-type materials handling unit shown above can also be stacked on similar racks.

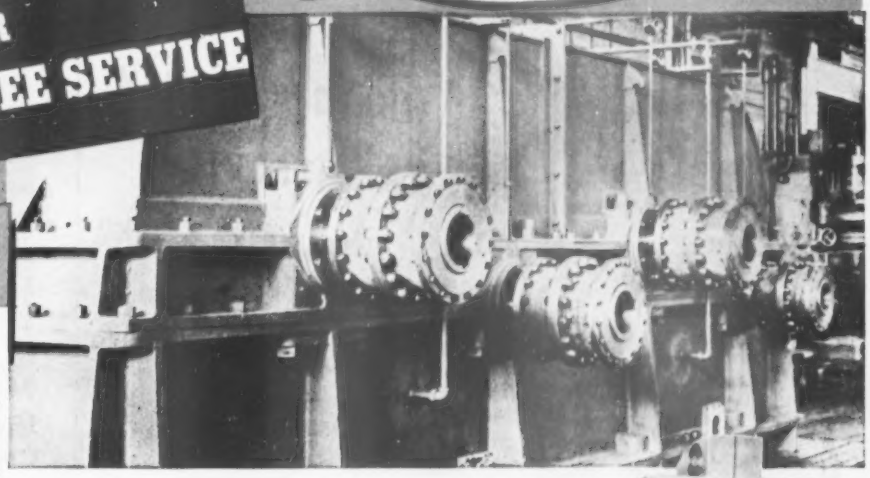
Unit is all-welded steel construction. Special construction of the legs assures safe stacking, the maker says. Capacity per unit is 4000 pounds, tiering capacity, 16,000 pounds. Standard height is 30 inches.

Phillips Mine and Mill Supply Co., 2300 Jane St. Pittsburgh.

Turn the page

INDUSTRY'S CHOICE FOR TROUBLE-FREE SERVICE

Small sizes are now packaged for ease of handling and stocking

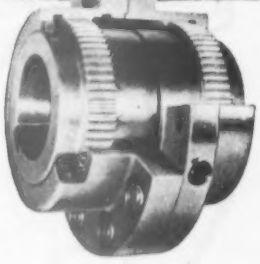


the rugged, dependable

WALDRON

ADVANCED DESIGN

GEAR COUPLINGS



NEW!
WALDRON
Junior
GEAR COUPLING
First light weight, inexpensive coupling of gear type construction for nominal bores—3/8", 1/2", 5/8", 3/4". Made of unbreakable nylon. Weight 2½ ozs. Non-corrosive, non-magnetic. Requires no lubrication. Full particulars on request.

built to eliminate the usual sources of costly coupling failure

The most dependable couplings are those of gear type construction. And throughout industry the WALDRON Gear Coupling is recognized as the most advanced in design and construction of all gear couplings. Its popularity stems from its many design refinements and operating advantages which combine to insure longer service life. Features such as WALDRON all steel construction, one piece cover sleeve, crowned gear teeth, longer lining up surface, automatic lubrication, less rotating weight and others, afford extra protection against costly shutdowns for repairs or replacements. Performance records of WALDRON Gear Couplings over many years have made them first choice of the leading equipment builders. For your gear coupling—specify WALDRON.

Waldron Couplings embody more than 40 years of coupling building experience. Available in all types and sizes. Design easily adapted for special applications. Write for descriptive catalog and specific engineering data.

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Waldron Series "A" and Junior Gear Couplings Francke Pin Type Coupling Anchor-Waldron Overload Cut-Outs

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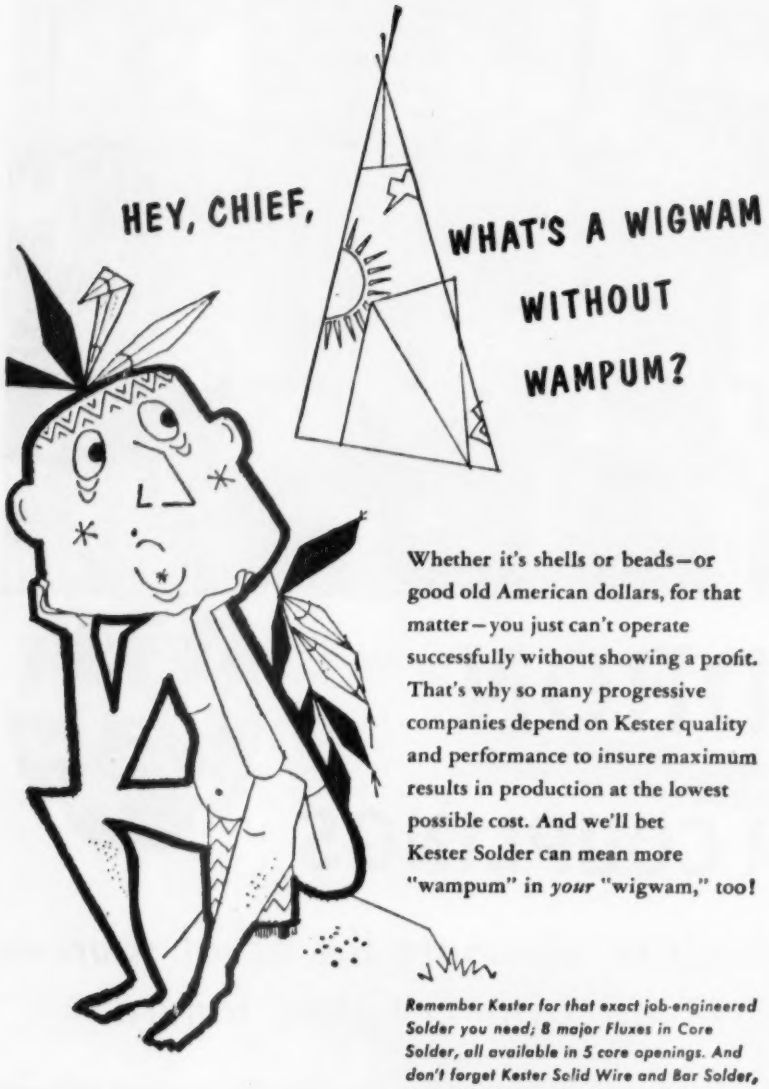

Whether it's shells or beads—or good old American dollars, for that matter—you just can't operate successfully without showing a profit. That's why so many progressive companies depend on Kester quality and performance to insure maximum results in production at the lowest possible cost. And we'll bet Kester Solder can mean more "wampum" in *your* "wigwam," too!

Remember Kester for that exact job-engineered Solder you need; 8 major Fluxes in Core Solder, all available in 5 core openings. And don't forget Kester Solid Wire and Bar Solder, Kester "Solderforms" and Kester Fluxes.

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SOLDER COMPANY

4213 WRIGHTWOOD AVENUE, CHICAGO 39, ILLINOIS
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MATERIALS HANDLING EQUIPMENT

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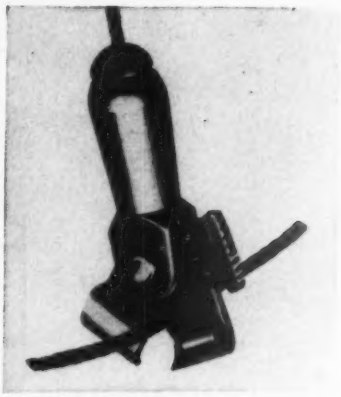


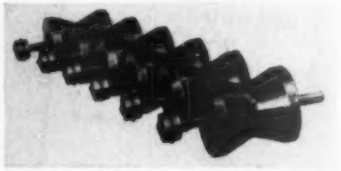
Sling Fitting Chokes Wire Rope

This fitting in addition to reducing chances of accidents when using wire slings also lessens the wear and tear on the wire rope, the maker says. The wire rope choker reduces strain in the rope because it eliminates the usual sharp bends These bends help weaken the rope and shorten its life.

The fitting consists of two pivoting members that completely encircle the rope. Thus the fitting adjusts itself to the load.

Electroline Co., 4121 S. LaSalle St., Chicago 9.

■



Permanent Magnetic Rolls

These non-electric magnetic rolls are designed to reduce costs of handling pipe, rods, angles, plates, bars, and similar items. Require little maintenance, and magnetic strength is guaranteed for the life of the units, the manufacturer says.

Rolls are available with either straight or concave face.

Dings Magnetic Separator Co., 4740 E. Electric Ave., Milwaukee.

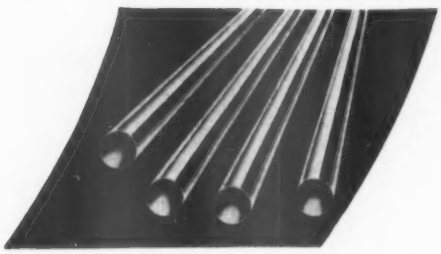
Turn the page

TRENTWELD

stainless steel tubing used for

PFAUDLER

flexible standard heat exchangers



Prompt deliveries of virtually custom built stainless steel heat exchangers are now available at competitive standard costs through the Pfaudler Company's system of flexible standards. Under this plan you may select the most applicable combination of length and diameter for a given heat transfer area. And nozzles may be selected for any size and in any position, either threaded or flanged.

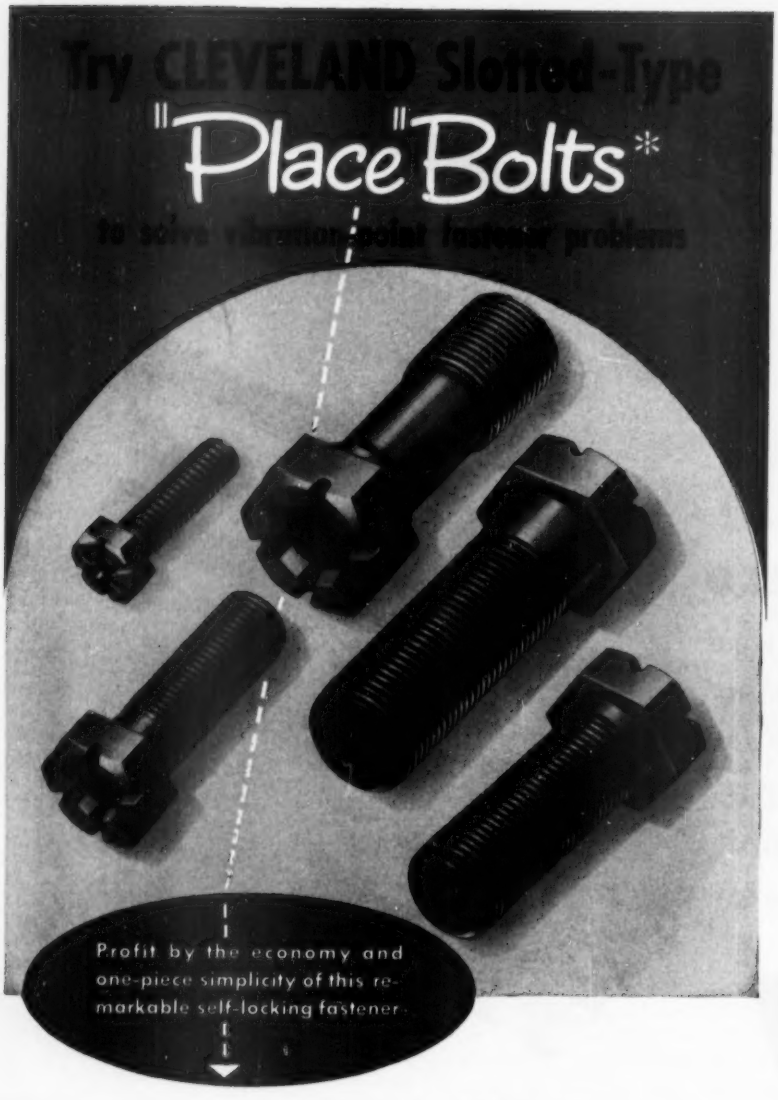
To meet Pfaudler's varied and exacting requirements for high quality stainless steel tubing, Trentweld is used. For Trentweld Stainless Steel Tubing is made by tube specialists who roll and weld stainless and high alloy tubing, exclusively.

You're sure to find a TRENTWELD tubing that will meet your needs. It's available in sizes from ⅛" to 40" OD, and in a wide range of grades, gauges and finishes. Our engineers have had broad experience in solving tubing problems in many different industries. So if you have a problem involving stainless or high alloy tubing, write to us today and let us help you solve it.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)


Try CLEVELAND Slotted-Type
"Place" Bolts*
to solve vibration-point fastener problems
Profit by the economy and one-piece simplicity of this remarkable self-locking fastener.

● Find out about Place Bolts *now!* New users and new uses are multiplying daily. A cold-forged fastener made of either high carbon or alloy steel, the Place Bolt head brings *elastic spring action* to bear on seating surfaces, combining with the elastic elongation of the shank to safeguard against loss of initial bolt-tension. Vibration-and-shock-proof holding power is assured. Sizes range from ¼" diameter upwards, standard or special. Write today for our Place Bolt Folder.

*Licensed under U. S. Patent No. 2543705.

CLEVELAND *Top Quality* FASTENERS

originators of the DOUBLE EXTRUSION Process

MATERIALS HANDLING EQUIPMENT

Begins on page 114

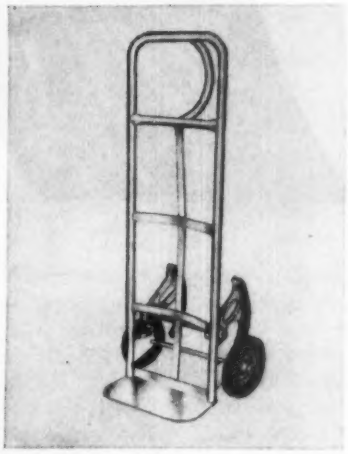
Rubber Conveyor Belt Designed for Steep Angles

Called Griptop, this new conveyor belt was especially developed to carry cartons and packages up and down grades as steep as 55 degrees. The belt is constructed with a special ridged and crosscut rubber surface to provide extra gripping power.

An added advantage of this belt is its self-cleaning action. As the belt rounds the end pulleys of the conveyor, the rubber ridges fan out. This releases materials that may have been lodged in the grooves. The maker claims the initial carrying angle will be maintained throughout the life of the belt.

B. F. Goodrich Co., Akron.

■



Stair-Climber Hand Truck

This 2-wheel utility hand truck can be used to go up or down stairs and curbs. Two aluminum rocker shoes, acting like an extra

Short or Long Term CAPITAL LOSS?

No matter how they are figured—
eye accidents are costly to industry.
Here are some of the estimated charges:

1 They cost nearly $400 in average compensation.

2 They cost $176,000,000 in lost man hours annually at an average per hour rate of $1.60.

3 They cost an unknown but sizeable sum in idle machine time. (Remember, industry invests $6,000 or more in tools to provide each job.)

4 They cost another appreciable sum in impaired worker morale.

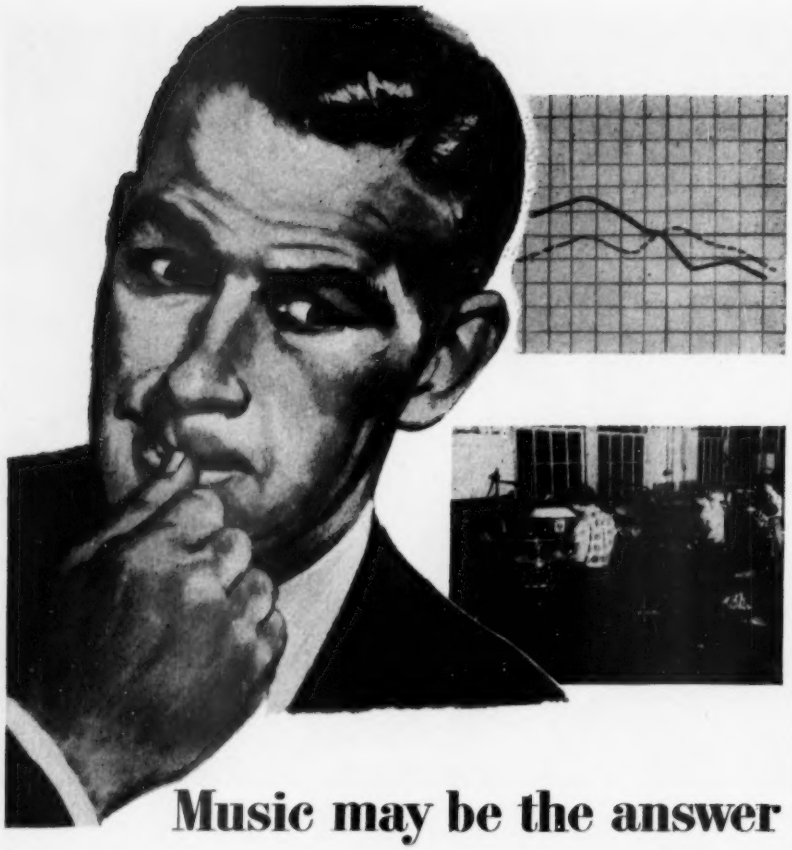
5 They cost additional money in increased rejects and lowered output when green workers must be substituted for skilled.

6 They cost money in first aid and medical attention whether the eye injury is major or minor.

Any industrial eye accident is a capital loss. If you lose the skill of a valued worker through the loss of an eye, you have a long-term capital loss in a very real sense—with no gain, long or short, to compensate. Contact your nearest AO Branch Office and learn how an AO Eye Protection Program can practically eliminate these costs and pay for itself in less than six months. Or write American Optical Company, 535 Vision Park, for free booklet "Improved Industrial Vision" which tells how AO's Industrial Vision Program cuts costs, increases production, decreases accidents.

American Optical
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities



Music may be the answer to your cost reduction problem

SOUNDS FARFETCHED . . . but the figures will surprise you. Checks on plants using work-music supplied by RCA Sound showed these amazing results:

1. **One plant operator estimated every dollar invested in work-music has saved him $84.00. More than 8,000 man-hours saved in 7 months.**
2. **An electrical manufacturer considered work-music responsible for a cut in rejects from 3% to 0.5%.**
3. **In an experiment in a plant using RCA Sound, music was shut off for a month . . . productive efficiency dropped 18%.**

Look into RCA Sound for improved production administration

In thousands of plants RCA Sound is at work every day as a paging system, public address system, and as a source of improved employee attitudes. True, enjoyable reproduction makes it a favorite with employees. RCA engineering and service have made it the choice of management over all other makes. RCA's broad technical and practical background offers all the benefits of comfort-engineered sound—eliminates the discomforts of poor sound performance.

How does PLANT LAYOUT affect a SOUND SYSTEM?

When you select RCA Sound, you get the economy of a custom-made system built from standard components. RCA sound systems have the flexibility you need to meet any plant layout requirement—to do any sound reproduction job you want.

Contact your RCA Sound distributor for details on RCA Sound and the nation-wide facilities of the RCA Service Company. Or mail the coupon today. **MAIL COUPON NOW**

Sound Products, Dept. 48-Q
Radio Corporation of America, Camden, N. J.

Please send me your free booklet on RCA Sound, *A New Industrial Giant.*

Name_____

Title_____

Company_____

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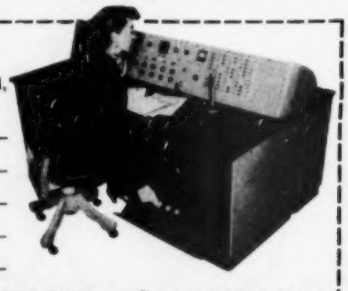
City_____ Zone____ State_____



RCA **RADIO CORPORATION of AMERICA**

MATERIALS HANDLING EQUIPMENT

Begins on page 114

set of wheels, support the load until truck wheels reach the next level. It is also useful in multi-level passageways.

After each new level has been reached the rocker shoes return to their normal position. Called E-Z Climb, the unit is available with steel or aluminum frame.

Automatic Bending Co., Harvey, Ill.

■

Designed to Move Trailers

Grip All Tractor has an electric-hydraulic clamp that can grip all types of trailers and hitches. The lower step clamp adjusts in and out, depending on position and height required, while upper clamp operates downward to secure the load.

Tractor operates on 12- or 18-volt battery. Has pull of approximately 700 pounds.

The Moto-Truc Co., 1971 E. 59th St., Cleveland 3.

■

RE-USABLE PIN-LOCK THIMBLES are featured with the 8-part braided sling manufactured by the A. Leschen & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12, Mo. These thimbles are fastened by pins that can be readily removed to permit re-use of the fitting. This means a saving, since the fittings usually outlast the sling, the maker points out.

Turn the page

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- Crushtrue grinding equipment
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Dayton 1, Ohio, U.S.A.

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NOW! a great NEW Milwaukee Sander-Grinder

at no increase in price

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Plus

- ✓ MORE POWER
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New dual-tool speeds production and maintenance work, and cuts costs

1. Increased power and higher speeds . . . 5000 RPM. Ample reserve to maintain efficient, high-speed, continuous, heavy-duty sanding and grinding.
2. New, exclusive, spring-loaded spindle drive prevents back-lash, assures smoother, quieter operation and longer gear life.
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4. High-volume ventilation with new, high-efficiency fan assures cooler operation and higher sustained speeds.
5. And, in addition, you get this improved Sander-Grinder performance at *no increase* over former prices of MILWAUKEE Sanders alone.

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MILWAUKEE ELECTRIC TOOL CORPORATION

5346 WEST STATE STREET • MILWAUKEE 8, WISCONSIN

Canadian Distributor: MATTHEW MOODY & SONS CO., Montreal

Begins on page 100

MEASURING & CONTROL

Liquid Level Control

Operation of this unit is based on the capacitive action of the liquid surrounding a porcelain-covered electrode. The electrode is connected by cable to a control box which is located for operating convenience.

Models are offered to operate on 115-volt, 60-cycle line. Special units are made for operation on several other power sources.

Thermo Instrument Co., 1166 ElCamino Real, Belmont, Calif.

■

Small Indicator Clocks Elapsed Time

Designed for installation where panel space is limited, but easy to read because of standard-size counter. This hermetically sealed elapsed-time indicator is tamper-proof as well as immune to conditions of humidity, temperature, and dangerous atmosphere, the maker claims.

Will register up to 99,999 hours.

Marion Electrical Instrument Co., Manchester, N. H.

■

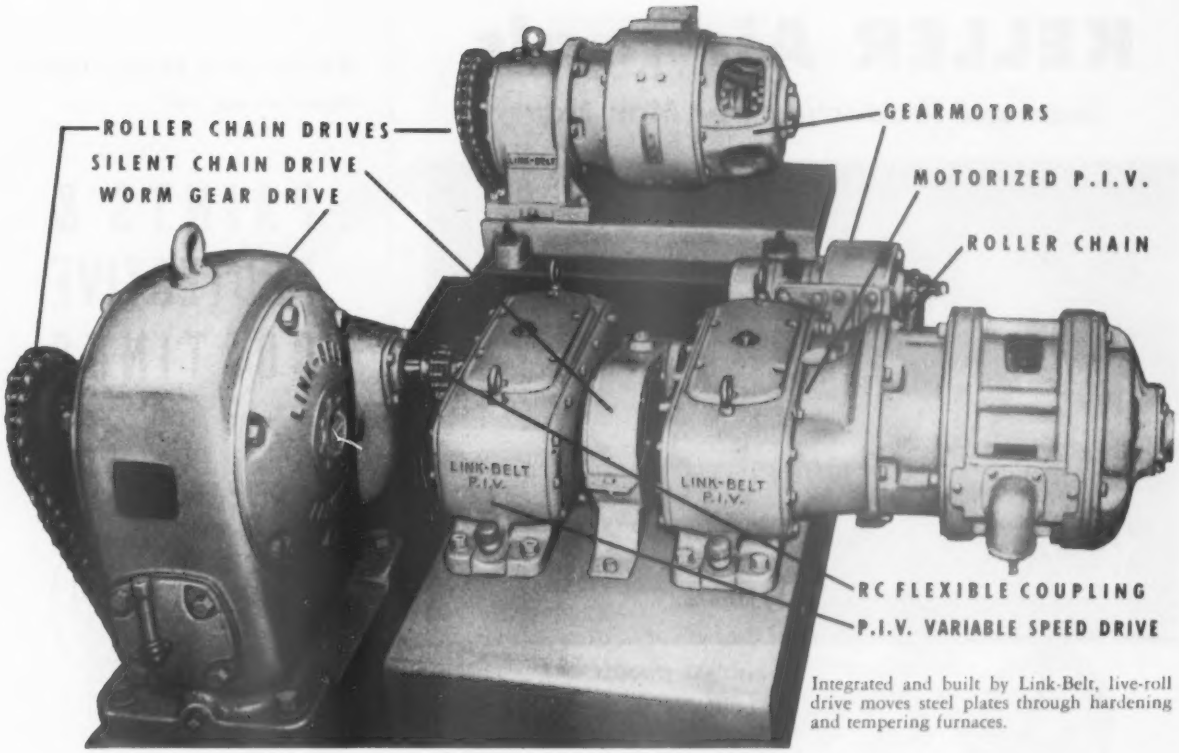
Simplified Liquid Level Control

This unit should aid you in the task of controlling liquid levels in tanks, vats, and other vessels. The components are an electrode holder, a relay, and a solenoid valve.

Components are available in several sizes to allow for flexibility. Furthermore, they can be used in all types of liquids.

Johnson Corp., Three Rivers, Mich.

Turn the page



Integrated and built by Link-Belt, live-roll drive moves steel plates through hardening and tempering furnaces.

Why it pays to have LINK-BELT integrate your power transmission

IF you have a complex power transmission application, use Link-Belt as a single source for all the necessary components and engineering service. Nowhere else can you find so great a background of experience . . . so wide a range of quality components.

As builders of industry's most complete line of power transmission equipment, Link-Belt offers you helical, herringbone and worm gear drives, chain drives, fluid drives, variable speed drives, bearings, clutches, couplings, etc.

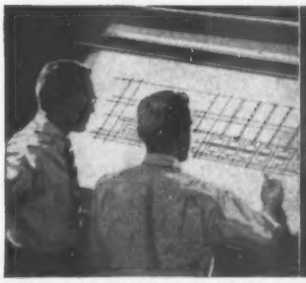
Link-Belt gives your problem careful analysis . . . determines the exact drives and controls for optimum performance. What's more, we pre-assemble various components for greater protection . . . carry through complete installation, if desired, down to the last detail.

For the best in equipment and planning, call the Link-Belt office near you. You'll find it pays to make Link-Belt your power transmission headquarters.

LINK-BELT

POWER TRANSMISSION EQUIPMENT

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13,129



OVERALL ENGINEERING. Vast experience of design and field engineering staff integrates all factors, assures expert planning.

ALL COMPONENTS. Link-Belt builds a complete line of power transmission machinery, provides components of top efficiency.

PRE-ASSEMBLY. Sprockets can be mounted in our shops—bearings fully protected. No need to get drawings from other sources.

SINGLE RESPONSIBILITY. When you rely on Link-Belt as a source, we accept responsibility for overall operation.

KELLER Air Tools

Increase Production per Man-Hour

ANOTHER EXAMPLE OF

KELLER *Air Tools engineered to industry*

Keller Screw Drivers and Nut Setters brought important benefits to a manufacturer of duplicating machines. He says: "Since we started using Keller air tools there has been a noticeable reduction in worker fatigue, and increased production per man-hour.

"Our work requires highly skilled, intelligent workers, and these tools have given them better satisfaction in their jobs, and improved our labor relations."

Weigh less

Consume less air

Reduce operator fatigue

Wide variety of handles, gearings, torques, speeds

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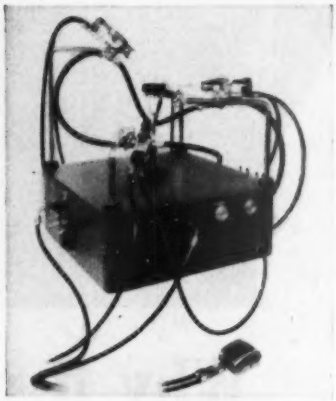


Portable Package Painting Machine

Designed to eliminate conveyorized painting systems for short production runs. This single-spindle, automatic unit can be used in most standard spray booths, the manufacturer says.

Has two control dials. One controls spindle speed, which ranges from 100 to 400 rpm.; the second regulates the operating cycle of the spray guns. A touch of the foot pedal starts spindle and guns, but stopping is automatic.

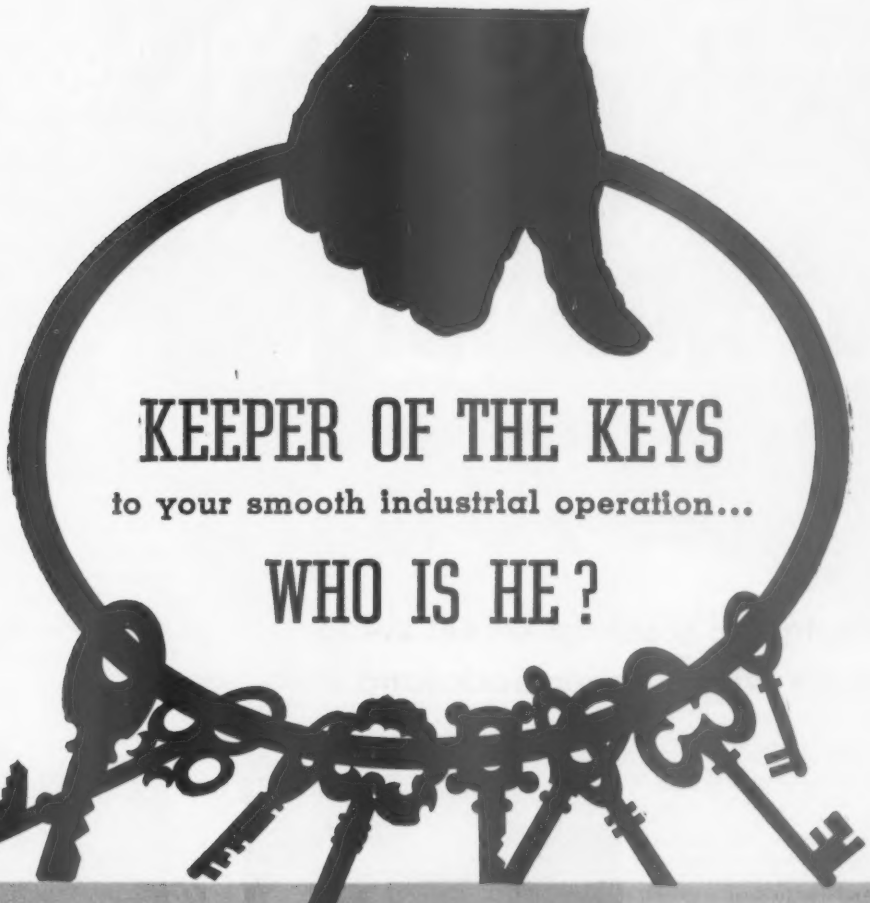
Machine can mount up to four guns. Catalog available on request.

Confirming Matrix Corp., 420 Factories Bldg., Toledo 2.

■

Paint Booth Features Water Wash Spray

Design of this paint booth has two-fold purpose: first, to maintain high health and safety standards in the area, and second, to



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to your smooth industrial operation...

WHO IS HE?

He is your Industrial Distributor.

He is your nearest, quickest, surest source of supply for countless items you need to keep your plant on the go.

He carries a myriad assortment of tools, machines, parts, accessories and manufacturing staples—in the right types, designs, grades and sizes you require.

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He warehouses huge stocks—many of them items of long-interval demands which otherwise would tie up your own capital (or expose you to the risk of shut-down, interruption or slow-up).

He knows where and how to obtain scarce or sorely needed operating requisites—thus sparing you the time, expense and tedium of searching for them yourself.

He explores the globe for new and improved equipment, appliances and other items that may speed up your production and cut your costs.

He has a reservoir of information about tools and machines from which you can benefit year after year.

As a "clearing house" for all your plant-operating requisites within the foregoing scope, your Industrial Distributor can take over from you a lot of costly bookkeeping—and headaches.

By serving many industrial consumers he also serves many producers, thus reducing *their* "paper work" too... which consequently enables them to pass further savings along to you.

YES, the industrial distributing system has so many advantages to all who use it that it is an indispensable and valuable factor in the economics of free enterprise. Nicholson continues to subscribe to its principles in both words and action.

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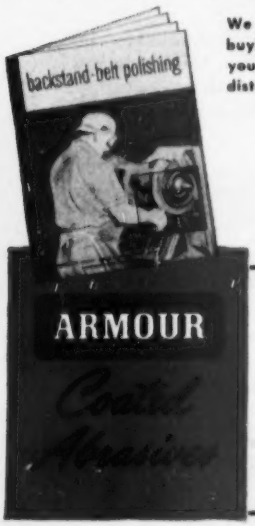
*Name of company available on request



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F

Begins on page 130

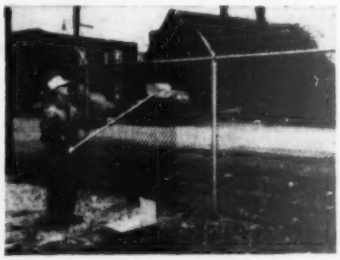
reduce downtime by making booth easier to clean.

To remove paint particles from the air for health purposes, the booth has a winding passage leading to the exhaust fan. This deposits much of the overspray on the walls. In addition, the exhaust air is washed with water four times before reaching the outside. Flushed paint particles are collected in removable pan, which can be easily cleaned, the manufacturer claims.

To reduce downtime for cleaning, walls are continually washed down with water. The booth is known as the Dynaprecipitor.

Binks Manufacturing Co., 3122 Carroll Ave., Chicago 12.

■



Applicator for Painting Fences

Known as FencPainteR, this mop-like applicator mounted on a roller paints wire fences faster and uses less paint, the maker says. It is rotated against the fence by means of a long handle. A metal guard protects the operator from splashing.

A special receptacle has been designed for use with the applicator. This unit employes a spring-suspended metal grid which regulates the immersion depth of the applicator.

Replacement costs are lower than for brushes, the manufacturer claims. Can also be used for painting flat or corrugated iron and sheetmetal structures.

Fencepain'er Corp., 2314 W. Van Buren St., Chicago.

Turn the page

You get ALL these Features when you buy PET Drills!

Reserve Power—for the extra-tough job. Powerful, Continuous-Duty Motors—built in PET's own factory. Dynamically Balanced Armatures—for freedom from vibration.
Six Heavy-Duty Ball and Needle Bearings.
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Aluminum-Alloy Die Castings—for light weight, easy handling.
Forced Ventilation—for cool running.
Precision-Cut, Heat-Treated Gears—for smooth, quiet power flow.

If you want the *best* for your maintenance or production work, take an extra look at the PET Superduty Drill shown here. Check its features! Here's a drill that's made for heavy, continuous duty...with *plus* power per pound . . . built to *work* right and *handle* right on the job.

Normally you might expect to pay extra for such features—in the form of "optionals" that jack up your cost. But that's not true of PET Drills! All these features are standard in the PET Superduty line . . . *and they're available to you at a standard drill price!* That's why the coupon below can save money for you. For free catalog and name of your nearest PET distributor, *mail it today!*

NOW...you can get the RIGHT DRILL for YOUR job!

PET Superduty Drills are available in 54 distinct models and 3 capacities: ¼", ⅜" and ½". Your choice of pistol or saw-type grip. With such a broad line, you don't have to compromise on a drill that's "almost" right! You can choose *exactly* the drill you need for your job. The PET Superduty line includes drills meeting U. S. Government and military specifications.

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Gentlemen: Please send us free copy of your PET Superduty catalog, and name of nearest distributor.

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● Lamina for motors is forced out of a guide and drops on the slide below. When the predetermined weight operates the MICRO switch, the air cylinder is actuated and pushes the lamina to the next assembly position.

This ingenious device for automatically weighing and handling materials is but one of innumerable uses plant superintendents, electricians and maintenance men are finding for these rugged, dependable MICRO switches.

Complete stocks of MICRO switches are available from distributors in 142 key cities for your convenience in selecting the switches which can make your present equipment safer, more automatic and more productive.

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MICRO A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

WHAT'S NEW IN EQUIPMENT

Begins on page 100

PLANT HOUSEKEEPING & SANITATION

Magnetic Sweeper for Aisles and Roads

Designed to remove nails, tacks, and other tramp iron from factory aisles, roads, and parking lots. Called Super-Sweeper, it comes with a removable frame and wheels, so it can be used on a fork truck, as shown above.

The sweeper is offered in 3-strength magnets and in widths from 24 to 60 inches. Can be cleaned easily and quickly.

Eriez Manufacturing Co., Erie, Pa.

■

Electric Sewer Cleaner

This machine is able to clear obstructions 100 feet from the sewer entrance. The cutting tools attached to the end of the snake can remove roots, grease, chips, and other objects from the pipes.

Snakes and tools can be rotated in either direction. Unit is mounted on four wheels and has a 2-position handle to make going up and down stairs easier.

Oster Manufacturing Co., 2057 E. 61 Place, Cleveland.

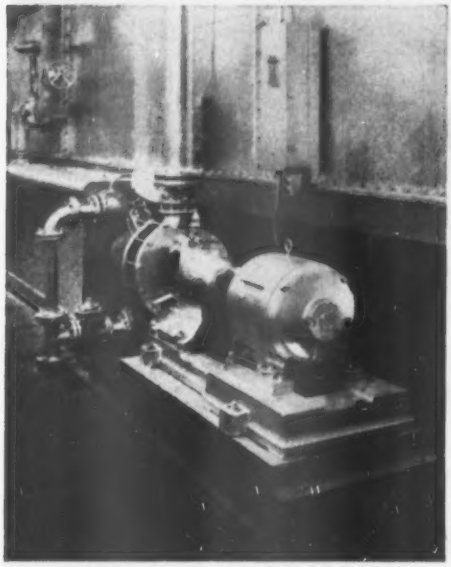
Turn the page

COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

Complete Mahon Steel Drum Finishing System Installed in the U. S. Steel Products Plant at Dolton, Ill. Similar Mahon Installations, including Metal Cleaning, Rust Proofing and Drying Equipment, are also installed in U. S. Steel Products plants at Sharon, Pennsylvania, and at Alameda, California.

General View of the Complete Mahon Steel Drum Finishing System Installed in the Port Arthur, Texas, Plant of U. S. Steel Products Division of the United States Steel Corporation.



One of the large Acid Recirculating Pumps employed in the Pickling and Descaling Stage of the Mahon Equipment illustrated above. Corrosive resistant material is employed for Pumps, all Piping, Solution Tanks, Processing Tunnel Housing and other parts exposed to corrosive materials.

Chemically Clean, Scale-Free, Rust Inhibited U. S. Steel Drums Get their Fine Finish in Mahon Equipment!

In four of its strategically located steel drum plants, The U. S. Steel Products Division of the United States Steel Corporation depends on Mahon Finishing Systems to produce its high quality, 100% scale-free, rust-inhibited steel drums. These drums are absolutely clean, and are protected with a finish which has been processed for maximum adherence and endurance. In the prepainting metal treatment the drum shells and end plates pass through a nine-stage Mahon Cleaning, Pickling and Phosphating Machine—the last stage of which is a chromic acid rinse. These machines are designed with conveyors outside the processing tunnel to protect chain, trolleys and track from the corrosive action of sulfuric acid. Conveyor adapters of noncorrosive material pass through a Patented Mahon Hydro-Hermetic Seal which effectively seals the top of the processing tunnel throughout its entire length. If you are contemplating new finishing equipment, you too, will find Mahon engineers better qualified to determine your equipment requirements and to do the all-important planning and engineering to insure specific results. Regardless of what your product may be, Mahon planned and Mahon built equipment will prove more economical over a period of time. See Sweet's Plant Engineering File for information, or write for Catalog A-653.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens, Core Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other units of Special Production Equipment.

MAHON

"We chose
TOKHEIM PUMPS
and IMPROVED OUR
LIQUID HANDLING!"

For filling oil coolant reservoirs directly from drums

You'll find it pays to standardize on TOKHEIMS. These double-action hand pumps have no equal for fast, easy, safe handling of liquids. Stop wasteful, dangerous dripping and slippery floors. Reduce fire hazard and accidents common to other methods of transfer. Save on drum storage space. More useful—available with optional parts to handle a wide variety of products. UL-approved for petroleum liquids. Available in hose and spout models—for drums, skid tanks and underground installations. Call your dealer, your Tokheim representative, or write the factory for descriptive literature.

For refueling lift trucks and other industrial equipment

DO YOU HANDLE ANY OF THESE LIQUIDS?

☐ Acetates ☐ Alcohols ☐ Ammonia ☐ Anti-Freezes ☐ Cutting and Flushing Oils ☐ Lacquer Thinners ☐ Plasticizers ☐ Solvents — Aromatic, Chlorinated, Petroleum ☐ Wood and Vegetable Oils

A Tokheim may be used for these and others! Tell us your problem.

For transferring liquids from drums to smaller containers

QUALITY TOKHEIM DOUBLE-ACTION HAND PUMPS

General Products Division
TOKHEIM OIL TANK AND PUMP CO.
Designers and Builders of Superior Equipment Since 1901
1652 WABASH AVE., FORT WAYNE 1, IND.
Factory Branch: 1309 Howard St., San Francisco 3, Calif.

WHAT'S NEW IN EQUIPMENT
Begins on page 100

SAFETY & PLANT PROTECTION

Individually Packaged Annunciator Unit

Here is a complete automatic annunciator service in a packaged wiring unit. For installation it only needs to be connected to the trouble contacts, the audio signal, and the power.

When trouble occurs the red and green lamps light and the audio signal sounds. A toggle shuts off the audio signal and the green light. When the proper operating conditions are regained the audio signal is sounded again, the green light illuminated, and the red light goes out. Operation of the toggle again silences the audio signal and extinguishes the green lamp. This indicates the normal conditions at the contacts.

Known as Vigilarm, it guards any machinery or equipment that has a contact to initiate the alarm.

H. R. Kirkland Co., Morristown, N. J.

■

Sprinkler to Distribute Even Water Pattern

This new sprinkler arrangement directs no water at the ceiling and produces a finer spray. It also sprays water in a wide, even pattern, the manufacturer claims.

Because no water is wasted on the ceiling, more is available to fight and limit the fire. This head has been approved by the Factory Mutual Research Laboratories.

Grinnell Co., Inc., 260 W. Exchange St., Providence, R. I.

Turn the page

From fast material removal to satin-smooth finishing . . .

Speed up your surfacing jobs with Black & Decker Sanders!

Powerful, versatile, perfectly balanced!

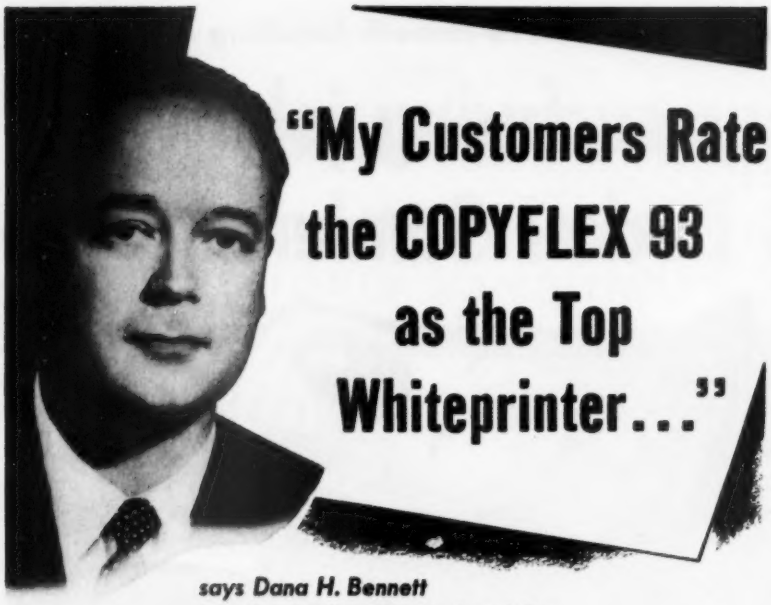
WHETHER you're surfacing metal, wood or compositions . . . in production, construction or maintenance . . . Black & Decker Sanders are the tools for you! You have your choice of *four* rotary models to drive abrasive discs, saucer grinding wheels, "Whirlwind" wire cup brushes, rotary gouging and planing heads . . . plus the new orbital model that gives a satin-smooth finish 10 times faster than by hand.

Whatever your choice, you get a powerful B&D-built motor, *custom-made* for the tool it drives . . . streamlined design and perfect balance for easier handling . . . and top-quality construction features for which Black & Decker is famous! Ask for a demonstration at your favorite Black & Decker outlet. Write today for detailed literature to: THE BLACK & DECKER MFG. CO., 602 Pennsylvania Avenue, Towson 4, Maryland.

BLACK & DECKER 34 Factory Branches SERVICE

. . . use them to save time, trouble, money!

BD TOOLS



"My Customers Rate the COPYFLEX 93 as the Top Whiteprinter..."

says **Dana H. Bennett**
Bruning Drafting Room Specialist

"Yes, wherever I've sold a COPYFLEX 93*—and I've sold plenty of them—engineers and draftsmen tell me there's nothing like it for speeding prints. They find it the finest heavy-volume whiteprinter available. They're pleased with its continuous high-speed production of top quality, dry, ready-to-use prints from either sheets or roll stock. Its vacuum feed permits easy insertion of curled originals. On top of this, the '93' needs no expensive ventilation system or plumbing. Furthermore, it's just one of a complete line of Copyflex machines to meet any price or volume requirement."*

From prints to pencils, Bruning-trained men like Mr. Bennett can fill every drafting requirement. You receive "in-person" attention to your needs and fast service on all kinds of drafting room equipment to help you turn out better work in less time at lower cost. Send coupon today for more facts and figures on Copyflex.

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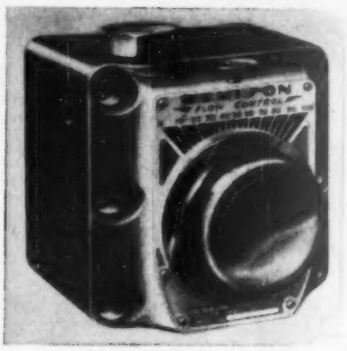
City..... Zone.... State.....

OFFICES IN PRINCIPAL CITIES

BRUNING
Everything for the Engineer and Draftsman

Begins on page 100

VALVES & FITTINGS



Valve to Meter and Control Oil Flow

A multi-range flow control valve that will maintain oil flow at a uniform rate regardless of circuit pressure variations has been marketed. Designed for operating pressures up to 3000 psi.

Features a 2-way adjustable orifice. Allows flow regulation within a given range and also a choice of ranges. Offered in 2 and 3-port types in ½-, ⅜-, and ¾-in. sizes for subplate mounting.

Can be used in bleed-off, meter-in, or other standard circuits, the maker says.

The Denison Engineering Co., 1160 Dublin Road, Columbus 16, Ohio.

■

Synthetic Hard-Rubber Pipe and Fittings

Tempron is the new heat- and chemical-resistant hard-rubber compound. Also has high rigidity.

Pipes up to 8 inches O.D. and fittings, including flanges, couplings, tees and elbows, are available. Tempron is also offered as sheet, rod, and tubing.

The American Hard Rubber Co., 93 Worth St., New York.

Turn the page

The Day the Cake Fell!

Just suppose all the nuts, bolts and screws were suddenly removed from a sparkling new range. A great deal more than a cake would fall—as the illustration above dramatically shows.

Yes, fasteners *are important*—and worth all the time and care you take in selecting those that are "just right" for your product. Lamson & Sessions is currently supplying most of the appliance manufacturers with bolts, nuts and screws—each type engineered to meet individual requirements.

Regardless of the product you manufacture; it will pay to take a critical look at the fasteners you are now using and ask yourself these questions:

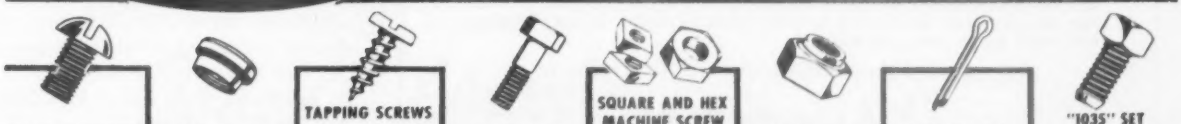
Can I save money by replacing a "special" with a "standard"? Or will the use of a "special" simplify production, thereby, saving time and perhaps materials?

Remember, whatever your problem, to check with Lamson & Sessions—one of the few manufacturers offering a *complete line* of fasteners teamed with expert engineering service.

The LAMSON & SESSIONS Co.
1971 West 85th St. • Cleveland 2, Ohio
Plants at Cleveland and Kent, Ohio • Birmingham • Chicago

Lamson + Sessions

FOR PROMPT DELIVERY AND HELPFUL SERVICE, ORDER FROM YOUR LAMSON DISTRIBUTOR



MACHINE SCREWS — Precision made for fast, economical assembly.

PLUG NUTS — Ideal for blind or hard-to-reach places.

TAPPING SCREWS — Choice of round, pan, truss, flat oval, hexagon and Phillips heads.

CAP SCREWS — "1035" Hi-Tensile Heat-treated steel.

SQUARE AND HEX MACHINE SCREW NUTS — Semi-finished, hot pressed, cold punched.

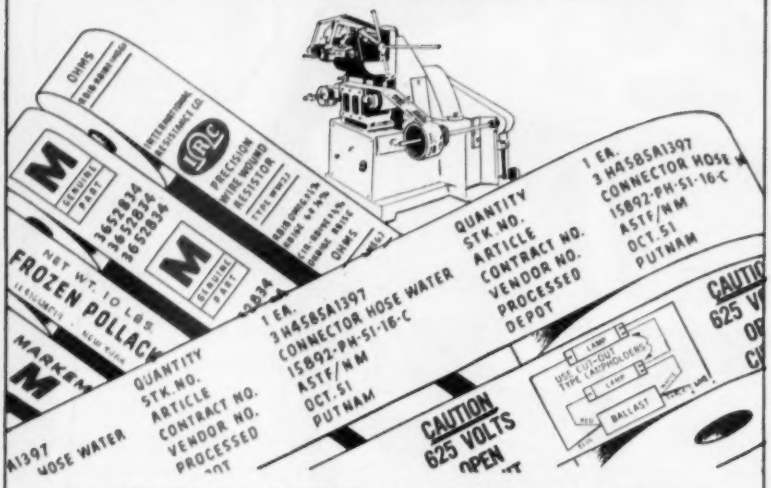
LOCK NUTS — Economical, vibration proof. Can be used repeatedly.

COTTER PINS — Steel, brass, aluminum and stainless steel.

"1035" SET SCREWS — Cup point type, hardened and heat-treated.

MARKEM SOLVED THIS MARKING PROBLEM

PRINTING LABELS
ON PRESSURE SENSITIVE TAPE



The introduction of pressure sensitive tape for industrial uses offered many advantages if *label* data could be printed on the tape *in the plant itself when needed*. Markem developed methods that permit printing of stock number, part number, trade mark or other designation on this tape. Label inventory problems are thus eliminated. Manufacturers can now print the exact number of labels required . . . readily changing variable information or color of ink when desired. The Markem method used includes a Markem machine which makes up to 85 imprints per minute, rewinds the roll of tape automatically, and shuts itself off after a selected number of imprints. Thus Markem has provided industries of all types with a more modern, more attractive and less expensive means of labeling.

MARKEM® MARKS THEM ALL

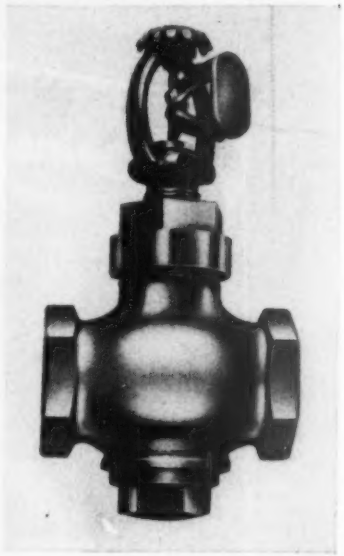
CAN MARKEM HELP YOU? Printing labels on pressure sensitive tape is but an example of how Markem solves industry's marking problems. Markem has been providing industry with production techniques and equipment to identify, decorate or designate its products, parts and packages since 1911. Markem also provides technically trained men who are available in your area to assure *continued* satisfaction with Markem methods and equipment.

When *you* have a marking problem, tell us about it and send a sample of the item to be marked. Perhaps a complete Markem method has already been developed to solve your problem. If not, Markem will work out a practical solution.

Markem Machine Company, Keene 18, N. H., U.S.A.

MARKEM ...TO MAKE YOUR MARK

Begins on page 138



Safety Valves for Fuel Lines

This valve was especially designed to check fuel-fed fires. The automatic shutoff feature of the valve operates on a temperature-controlled device.

At a specified temperature the head opens, releasing tension on a heavy spring, which in turn closes the valve in a fraction of a second, the maker claims. If an explosion should knock the head off the valve, it will also close the fuel lines. This prevents secondary explosions and fires.

Valco, Inc., 1410 West St., Cincinnati 15.

■

Polyethylene Valves

These 1- and 2-in. bore valves are said by the maker to resist the action of hydrofluoric, sulfuric, nitric, and hydrochloric acids at temperatures up to 160 F. They are light in weight, also.

Called Agilene Valves, they are available with standard drilled flanges for use in existing systems, as well as new installations.

American Agile Corp., P.O. Box 168, Bedford, Ohio.

Turn the page

AN ANSWER TO COMPETITION'S CHALLENGE FOR LOWER COSTS

How to start a cost reduction program

1. Authorize a thorough analysis of your product designs.
2. Assign a competent engineer to direct this study.
3. Institute a training program to initiate new design thinking.
4. Provide engineering talent to translate advanced product ideas to practical low-cost production designs.

An Effective System for Cutting Costs. Lincoln Electric has developed a comprehensive training program for designers and production engineers. Known as the Lincoln Weldesign System, the program provides simple methods for improving product strength and appearance while cutting costs as much as 50%.

In-plant Training Program. The simple procedures of the Lincoln Weldesign System for creating efficient, low cost designs can be presented within your own plant to designers and production engineers. Consult your Lincoln Electric representative for details.

For money-backed guarantee on cost reductions through welded steel design write:

James F. Lincoln **PRESIDENT**

THE LINCOLN ELECTRIC COMPANY • 22801 St. Clair Avenue • Cleveland 17, Ohio

THE ACTUAL IS LIMITED: THE POSSIBLE IS IMMENSE

You can afford

Ultrasonic
REFLECTOSCOPE INSPECTION

Dependable, non-destructive testing is often vitally important even though the need may occur at infrequent intervals or involve relatively few pieces. SPERRY INSPECTION SERVICE makes Ultrasonic Testing *economically* available under these conditions. You can hire a Sperry REFLECTOSCOPE and the services of an experienced inspection engineer whenever you need them . . . for any length of time from four hours up.

You'll find this service ideal for periodic machinery inspections, testing shipments of raw materials, testing new or pilot-model products, periodic quality checks and countless other applications to eliminate on-the-job failure or to prove and improve product quality.

Almost any material can be tested; hidden defects are quickly and dependably located in up to 30 feet and over of solid steel. Write now for complete information.

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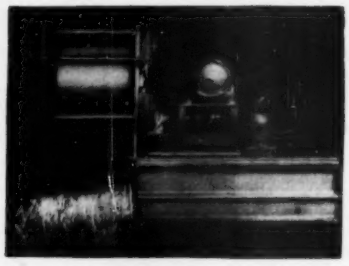
MATERIAL TO BE TESTED _____
NAME _____
TITLE _____
COMPANY _____
CO. ADDRESS _____
CITY _____
ZONE _____ STATE _____

WHAT'S NEW IN EQUIPMENT

Begins on page 100

MISCELLANEOUS



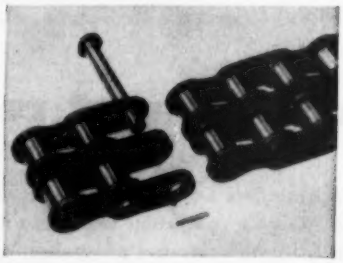
Electrically Powered Scrap Baller

This machine is designed to make short work of packaging stringy scrap and wire for disposal. Rolls the scrap into a compact cylinder 22 inches long and 28 inches in diameter.

The Scrap Baller is powered by an electric motor.

Phillips Mine and Mill Supply Co., 2324 Jane Street, Pittsburgh.

■



Easy-to-Assemble Roller Chain

Here is a way to reduce machine downtime due to roller chain failure. A single pin coupler is installed at convenient intervals along the chain to make assembling and disassembling easier.

This chain is offered in ASA standard and heavy series, 1 through 2½ inches pitch sizes in mutliple widths. It is made up in 10-ft. lengths, with varying coupler spacing.

Chain Belt Co., Springfield 2, Mass.

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Featuring additional products, specialties and services for power plants

For FREE Sanitary Survey
OF YOUR PREMISES CONSULT YOUR DOLGE SERVICE MAN OR WRITE:
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Pipe Repair CLAMPS
Made for every type of leak—any temperature or pressure. Send for Catalog No. 41-O.
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STOP that WATER
With FORMULA NO. 640, a clear liquid which penetrates 1" plus in concrete, brick, stucco, plaster, etc. Seals out water, dirt. Holds 20' head. Use outside and in. Preserves all absorbent materials. Sold 14 years. Quick, economical, sure. $3 in 55's. Free sample. See Sweet's.
HAYNES PRODUCTS CO., OMAHA 3, NEBR.

STOP DUST

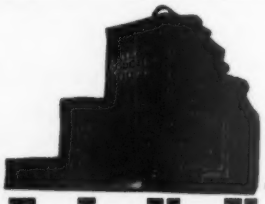
DUSTKOPS	22 Models
UNIT TYPE	300 cfm to 10,000 cfm
LOW COST	¼ hp to 15 hp

AVAILABLE FROM STOCK

For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS

Send for Cat. 605t; describe problem for recommendation by return mail, without obligation

AGET-DETROIT CO. • ANN ARBOR, MICH.



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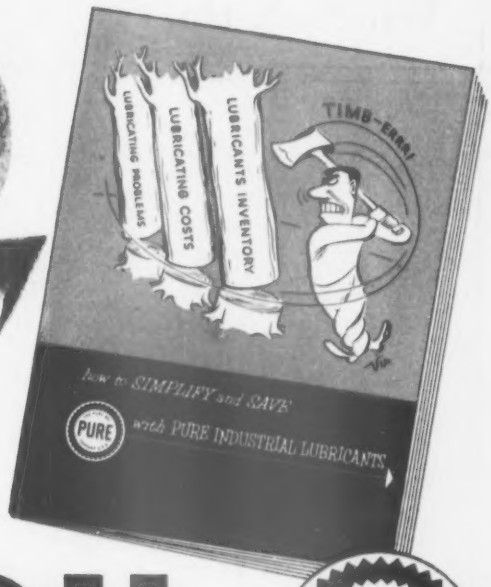

This 12-page, 8½ x 11-inch illustrated booklet that explains, in complete detail, how you can simplify and save with

PURE OIL INDUSTRIAL LUBRICANTS

THE PURE OIL COMPANY, U.S.A. PURE

Pure Oil specializes in top-quality *multi-purpose* oils and greases—each one designed to do a number of *different* jobs instead of just one specific job. And do each job *equally well.*

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by Phillips

"Nope! Not more than 3 Phillips Recessed Head Screws for the lot. After all, it's only ivory."

PERFECTLY MATED! Only Phillips Drivers are perfectly mated to Phillips Screws. Look for the name Phillips on the shank.

SALES VALUE is only one of many advantages added to your product when you use Phillips Screws. These screws also save money, work, time. They eliminate driver skids, damaged parts and split screw heads. They cut driving time up to 50%. And they set up tighter having a maximum strength of head due to their design. For best results, choose Phillips Wood, Machine, Tapping Screws or "Sems."

PHILLIPS *Cross-Recessed-Head* SCREWS

X marks the spot... the mark of extra quality

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CENTRAL SCREW COMPANY • CONTINENTAL SCREW COMPANY • THE EAGLE LOCK COMPANY
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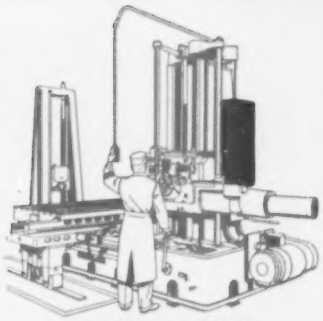
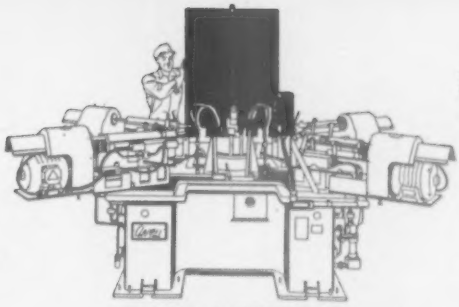
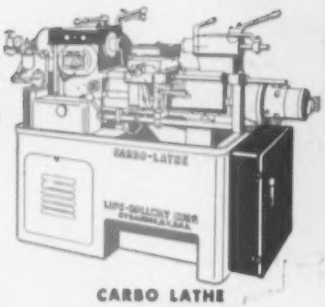


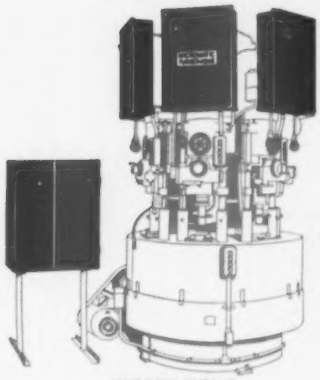
HORIZONTAL BORER



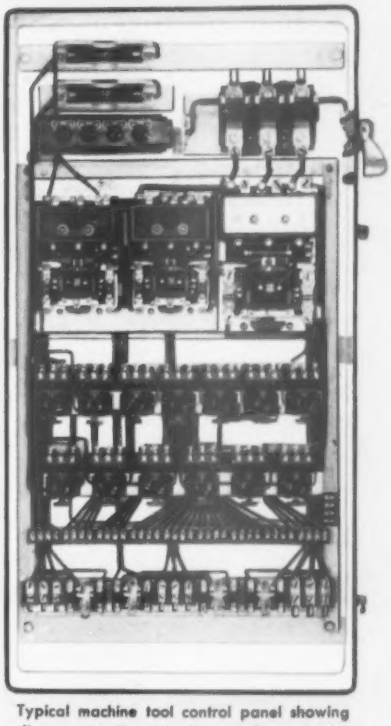
DRILLING MACHINE



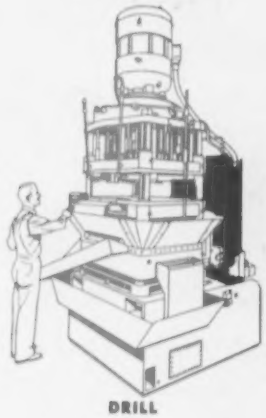
CARBO LATHE



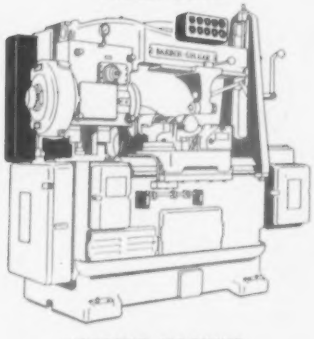
TURRET-HONE



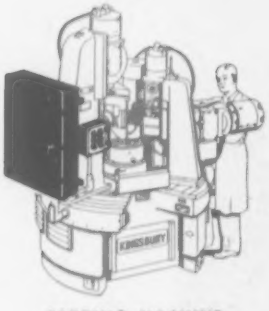
Typical machine tool control panel showing disconnect unit, contactors, and accessories



DRILL



HOBBING MACHINE



TAPPING MACHINE

MACHINE TOOL CONTROL PANELS

● ● ● ENGINEERED TO SATISFY YOUR NEEDS

Allen-Bradley control panels are popular with machine tool builders, because—

1—A-B contactors and relays have acquired a world-wide reputation for dependability and precision control. Consistently, they perform millions of trouble free switching operations.

2—A-B engineers, through long experience, are skilled in developing sequence control panels. Due to the compact design of A-B components, smaller panels are a common result . . . which means less space is used on the machines.

3—The A-B trademark is a sales asset for your motorized machine tools. It is the mark of Quality in motor control . . . known and accepted by machinery buyers, everywhere.

It will pay you to discuss your control problems with Allen-Bradley. A field force of Allen-Bradley engineers, located in all principal cities, is at your service. We shall be glad to send you the A-B Handy Catalog.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

4-53-R

A-B Quality

ALLEN-BRADLEY QUALITY

SPECIAL PANELS

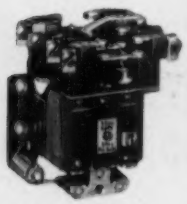
A-C & D-C TROUBLE FREE RELAYS

from 1 to 12 POLES

THE UTMOST IN RELAY DEPENDABILITY

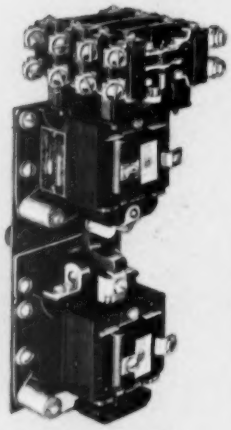
HUM-FREE A-C RELAYS

Relays in hospitals, churches, etc., must be hum-free. For these places, Types BM and BXL relays are recommended. Continuous coil currents are not needed to hold them closed. Also useful for machine tools.



TYPE BM—Residual Magnetic Latch

Contacts are held closed by residual magnetism of core. A demagnetizing coil current opens relay.



TYPE BXL—Mechanical Latch 2-Unit Relay

Lower solenoid trips the mechanical latch of the upper relay to open the upper relay contacts.

Bulletin 700 Relays are built to the same critical operating standards as the larger switching units in the Allen-Bradley line.

They have only one moving part . . . the simple solenoid plunger that opens and closes the double break, silver alloy contacts. Available in many varieties of contact arrangements . . . up to 12 poles . . . with or without enclosures. Long, trouble free life makes these relays the ideal pilot controls for installations which are likely to get infrequent inspection and maintenance.

Send for Bulletin 700 containing complete details on ratings, dimensions, and related accessories.

Allen-Bradley Co.
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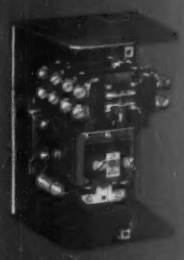
ALLEN-BRADLEY

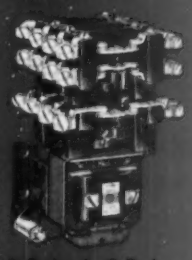
RELAYS & CONTACTORS

A-B Quality

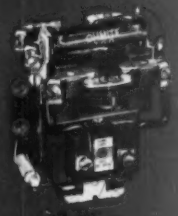
TYPICAL RELAYS in the ALLEN-BRADLEY LINE



Relay in Enclosure



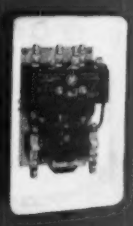
3 Pole A-C Relay



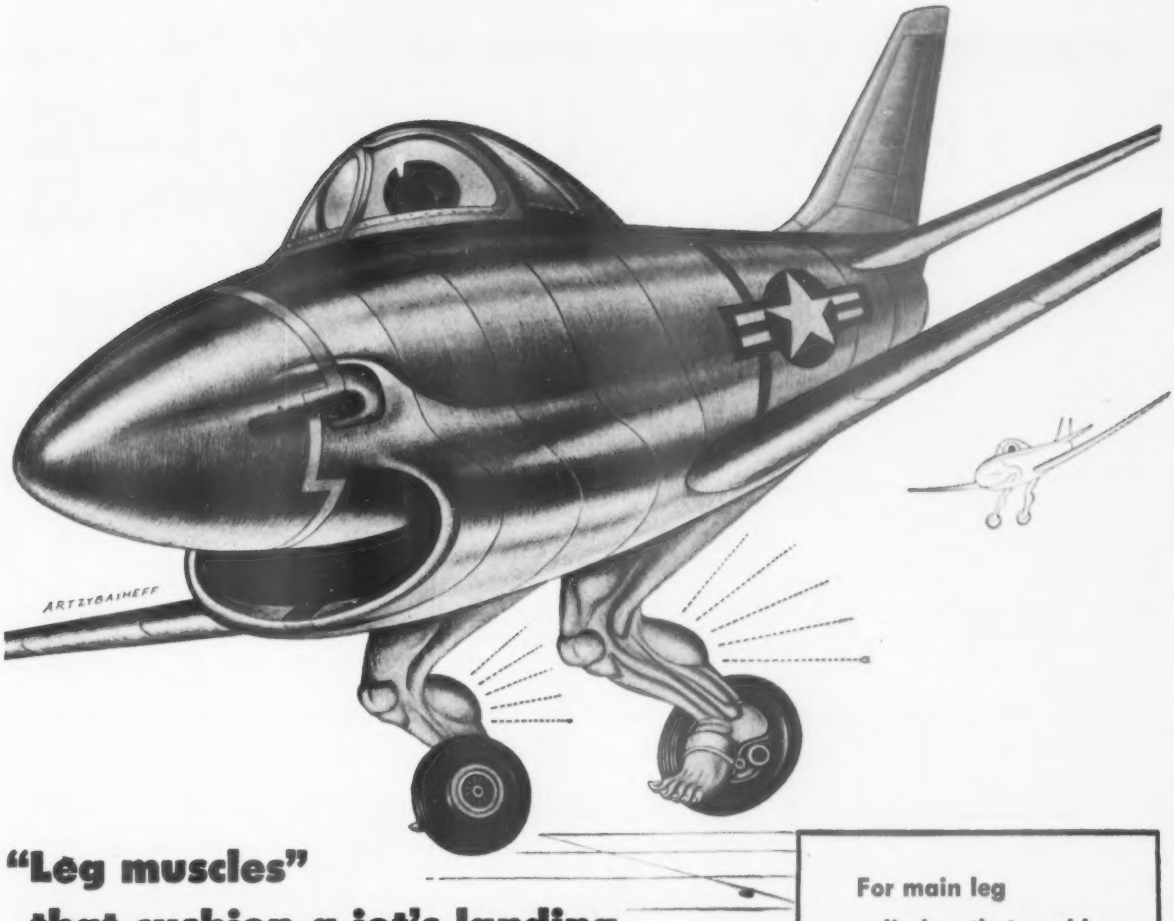
3-Wire Thermostat Relay

Low Current A-C Relay

D-C Relay



Bulletin 709 Size 3 Solenoid Contactor



"Leg muscles" that cushion a jet's landing

When the landing gear of an F-86 Sabrejet hits the runway at lightning speed, the shock is absorbed by hydraulic action within the tough, precision-made cylinder on each "leg." To machine these 37-lb. cylinders to exact tolerances from solid 158-lb. steel forgings . . . to give them mirror-smooth inside finishes . . . Cleveland Pneumatic depends on Lycoming.

If *your* metal-working needs—like Cleveland Pneumatic's—can be solved by precision production, or if your problem is volume fabrication, or "just an idea" in the rough or blueprint stage—*look to Lycoming*. Long famous for metal-working skills, Lycoming meets the toughest specifications of exacting customers, both industrial and military.

Lycoming's 2½ million square feet of floor space, its more than 6,000 machine tools, and its wealth of creative engineering talent all stand ready to serve your needs.

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LOOK TO LYCOMING

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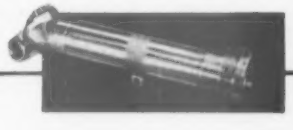
BRIDGEPORT-LYCOMING DIVISION, STRATFORD, CONN.

For main leg cylinders that enable a Sabrejet to absorb the jolt of high-speed landings—Cleveland Pneumatic looks to Lycoming's precision production



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SIGNIFICANT DEVELOPMENTS IN PRACTICAL LABOR RELATIONS

TOLD IN BRIEF FOR BUSY FACTORY EXECUTIVES

By PAUL A. KING • Attorney, Bigelow-Sanford Carpet Company, Inc.
Member, New York Bar

UNION GETS TIME STUDIES • *NLRB gives union right to look at employer's studies, conduct its own* . . . . . **Page 146**

DEMOTED EMPLOYEE GETS DISMISSAL PAY • *It's not "voluntary" when you quit to avoid motion, says arbitrator* . . **Page 146**

IS SEVERANCE PAY A GIFT? • *Yes, says a court, when it comes to figuring overtime under the Wage-Hour law* . . . **Page 148**

CAN YOU ASK WORKERS ABOUT UNION ACTIVITIES? • *No, says the NLRB. Yes, say the federal courts* . . . . . **Page 148**

UNEMPLOYMENT PAY FOR RETIREES • *New Jersey court rules that compulsory retirement is still a "voluntary quit"* . **Page 148**

UNION GETS IN ON JOB VACANCY INTERVIEWS • *Arbitrator lets union sit in on employee interviews for job vacancies, despite grievance procedure* . . . . . **Page 150**

COMPANY-WIDE BARGAINING DENIED LOCAL • *Clause in contract succeeds in keeping suggestion system out of local's clutches* **Page 152**

T-SHIRTS BECOME UNION SUITS • *"Join the Union" slogans on workers' T-shirts OK'd by NLRB* . . . . . **Page 154**

Union Gets Time Studies

Here's news for time study engineers! The National Labor Relations Board has increased the readership of its time studies by giving unions the right to look them over. It also hands them the right to run their own studies.

The union in the case that led to this decision grieved under the contract about a production standard for an operation. The union wanted to see the time study data developed by the company's experts. It also wanted to conduct its own time study. The NLRB's answer to both requests was "yes."

Reason: Union needs the data for intelligent bargaining. Refusal to grant these requests is a refusal to bargain—an unfair labor practice. (*Otis Elevator*)

Demoted Employee Gets Dismissal Pay

When a demoted employee quits rather than accept the demotion, is he entitled to dismissal pay? One arbitrator, at least, thinks that he is.

The employee in question started out as a messenger. Then he was promoted to clerk. The company cut down on clerks. Since he had the lowest seniority, the employee was bumped back to his old job. Not liking this a bit, he quit. But he claimed dismissal pay.

The arbitrator reasoned that when an employee is forced to

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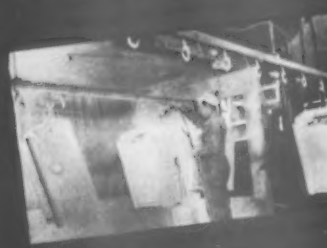

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Despatch combination gas-oil fired recirculating type, car bottom, stress relieving furnace. Capacity 80,000 lbs. Maximum operating temperature up to 1300° F.

Many leading aircraft plants report more production, better quality and lower costs since installing a modern Despatch Furnace such as that pictured above.

Modern Despatch-built heat treating, stress relieving furnaces are built to last. They are known for their long, trouble-free service, low maintenance and operating costs, and their high production records. Despatch designs, builds and installs conveyorized, pit, car loaded, crane, batch and pot type furnaces. When you call on Despatch, you'll get the furnace best suited to meet your plant's particular requirements most efficiently and economically. Despatch engineers are ready to plan your layout and make the installation. From start to finish Despatch installations are under a single responsibility, your guarantee of a speedy and satisfactory job.

For Better Solution Heat Treating of Aluminum — See the Modern DESPATCH *Quick-Quench* FURNACE

The most modern and efficient methods for the solution heat treating of aluminum are incorporated in Despatch quick-quench furnaces. The one shown at left is completely automatic, electrically heated, recirculating type designed to operate at temperatures up to 1250° F. Uniformity is possible within limits of ±5° F., and from work chamber to completion of quench requires less than 10 seconds. Capacity is 600 lbs. of aluminum plus supporting steel.

Call, Wire or Write to Dept. A—Let Despatch engineers analyze your heat treating problem now. A resident engineer near you will assist with your heat treating requirements.

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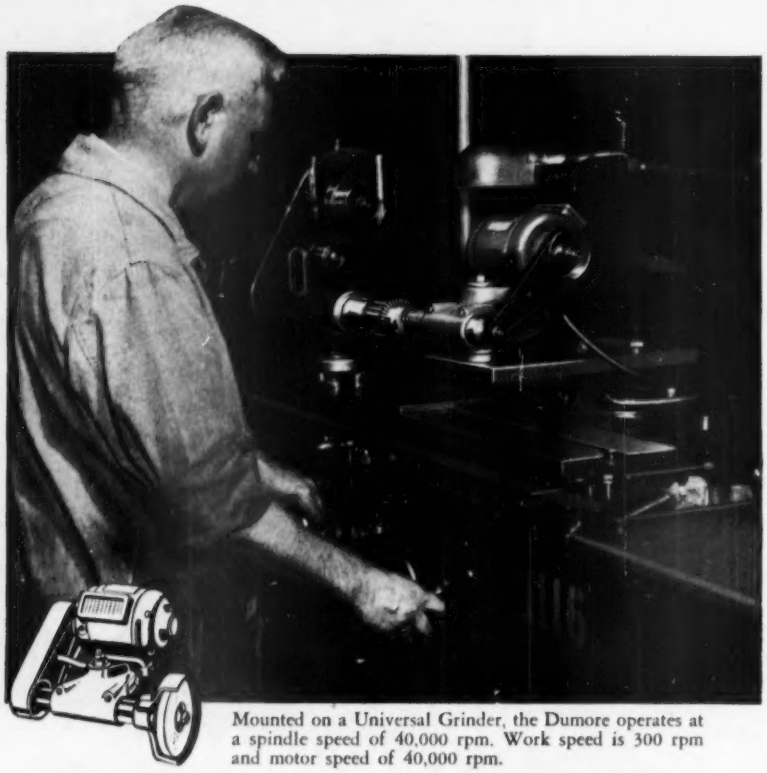
DESPATCH OVEN COMPANY

26-year record proves DUMORE® GRINDERS give low-cost, accurate service



Mounted on a Universal Grinder, the Dumore operates at a spindle speed of 40,000 rpm. Work speed is 300 rpm and motor speed of 40,000 rpm.

How DUMORE insures high-speed internal grinding . . . mirror finish at low cost

PRODUCING drill chucks requires a difficult jaw grinding operation. Smooth finish and correct back taper are necessary. And each day, the grinder must withstand millions of hammer-like blows transmitted to the grinding wheel and spindle bearings.

Since 1927, this chuck manufacturer has used DUMORE precision grinders. Here is his report:

"Our Dumore No. 5 units operate 100 hrs. weekly to internal grind open jaws for our ⅛" to 1" plain bearing key type chucks. Material is 60 Rockwell C hardness alloy steel. We remove .005".

"The Dumores are well adapted to this fine work and produce a glass-like finish. Their sturdy power transmission, solid spindle shaft, self-oiling features, air-cooled motor and variable speeds make them exceptionally well suited for this work. They deliver continuous operation with little effort and very low maintenance cost."

If you're seeking to improve internal grinding operations, investigate the advantages Dumore grinders provide. Get details from your industrial distributor or write direct:

THE DUMORE COMPANY
1341 Seventeenth Street • Racine, Wisconsin

PRACTICAL LABOR RELATIONS

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quit like this, it is not a "voluntary resignation." He is entitled to dismissal pay. (*Loew, Inc. Award*)

Is Severance Pay a Gift?

Is severance pay wages or a "gift"? It's a gift, according to a U. S. District Court in Tennessee. At least when it comes to figuring overtime under the Wage-Hour law.

The law says gifts to employees are not to be included in figuring overtime. Severance pay is a gift for this purpose. (*Memphis Bearing and Supply*)

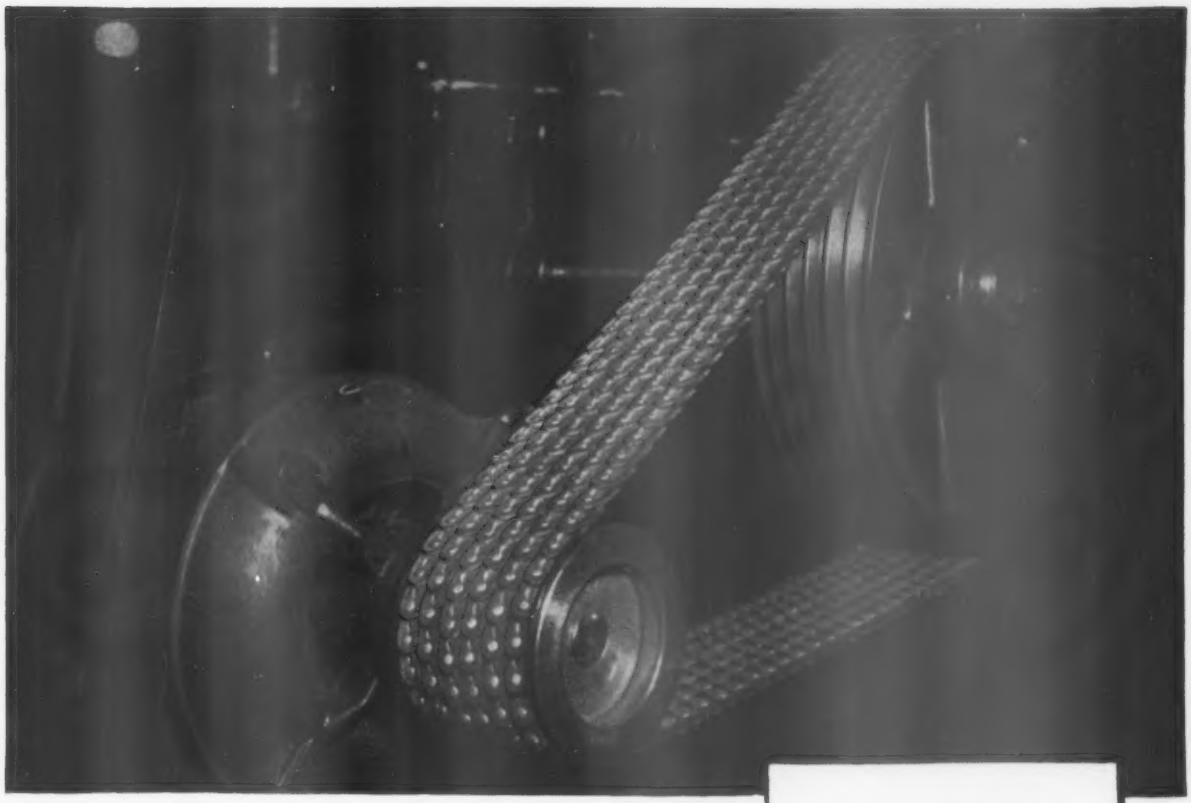
Can You Ask Workers About Union Activities?

Suppose your plant is being organized. Can you ask employees if they are members of the union or question them about their union activities? The National Labor Relations Board would say "no." But, if you appealed its decision to a U. S. Court of Appeals, the chances are it would say "yes." Seven courts have already ruled this way.

The way the federal courts look at it, such questioning — alone—will not be considered an unfair labor practice. It may not be long before the NLRB will join in this view. (*England Brothers*)

Unemployment Pay For Retirees

A great many states follow the example of New Jersey and do not pay unemployment benefits to an employee who quits his job. But suppose the employee is forced to retire under a pension plan? Is that the same as quitting? Or is he then entitled to



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All v-belts stretch—but with endless v-belts there's nothing you can do to take up this stretch once the motor has been completely "run-out". With Veelos it's another story! The adjustment is in the belt itself—even sliding motor bases are unnecessary.

Changing the length of each Veelos v-belt by just adding or removing links is the best, most efficient, way to keep the belts correctly matched. Using Veelos means that the job of adjustment is done easily and quickly . . . at a fraction of the cost of replacing with new belts.

Veelos, the adjustable v-belt, provides vibrationless, full power delivery. It is easier to stock and control because it is packaged on 100-foot reels in every standard width. And Veelos can be adjusted or made up in correctly matched sets with the least amount of machine down-time—at production-saving speed!

Have you seen this Veelos Facts Book?

Your Veelos v-belt distributor's salesman will be glad to give you a quick trip through this fact-packed, 36 page book. You'll find it well worth the few minutes it takes. Next time the salesman calls, ask him to show it to you.

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THE LINK
V-BELT

Write today for your copy of the Veelos Data Book—it is a completely illustrated, 28-page catalog that gives file-worthy product and engineering facts which you should have handy. We'll be glad to send you a copy at once.

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CESCO FOR SAFETY

PRACTICAL LABOR RELATIONS

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unemployment benefits?

How state laws stand on this question can be important to you. You may be able to improve your merit rating by watching your pension situation.

Most states permit the employee to collect both pension and unemployment insurance payments, reasoning that compulsory retirement is not the same as quitting. Some deduct federal social security payments from unemployment benefits. And some deduct both private pension payments and federal social security payments. A few deny unemployment benefits completely when the worker gets any pension at all.

A recent New Jersey court ruling puts an interesting slant on the problem. In the case in question, the pension plan was negotiated by the union. It was noncontributory. The court denied the retiring worker unemployment benefits on these grounds:

The plan was negotiated by the union on behalf of its members. Therefore, in the court's view, retirement by the members at the agreed-upon age amounted to a voluntary quit. (*Campbell Soup.*)

Union Gets in on Job-Vacancy Interviews

In the Bible it says that the meek shall inherit the earth. It often seems to employers that one objective of arbitrators is to fulfill this prophecy. Here's an award that illustrates the point:

The arbitrator involved ruled that when an employee is interviewed or tested by a foreman for a job vacancy, he may request that a union representative be present.

This rule, not in the contract, was laid down because of the

Whenever you select a power unit, don't put a straight-jacket on your ideas . . . consider ALL of the possibilities of modern power drives.

For example consider the many useful combinations that can be secured with the basic Master power units shown below. They're designed so they can be easily combined together to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features in one compact unit that you can use RIGHT where you want it. Nowhere else will you find power units that are so flexible, so easily adaptable, and in such a wide range of types and ratings.

Master power drives are available in thousands and thousands of ratings (1/8 to 400 HP) . . . in open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 430 to 1 ratio . . . with electric brakes . . . with fluid-drive . . . with mechanical or electronic variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best power drive for YOU.

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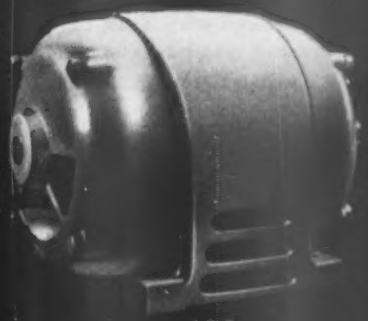

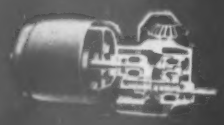

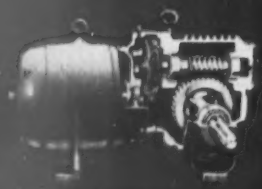

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PRACTICAL LABOR RELATIONS

Begins on page 146

arbitrator's feeling that some employees might be too meek to speak up for themselves—or they might not realize their potentialities. The company pointed out that the grievance procedure could be used by any employee who felt he was not properly interviewed. The arbitrator thought that an employee might be too timid to use the procedure.

On what peg did the arbitrator hang his ruling? It seems that in some departments of the company, this was the practice. The arbitrator made it universal. Watch those "departmental practices." (*Linde Air Products*)

No Company-Wide Bargaining for Local

Multi-plant companies involved in company-wide collective bargaining try to operate on a national basis, adapting to local conditions as required. However, different local unions—although of the same international union—have varying ideas as to what they want. This makes uniform contract administration tough.

Here's how one company assured itself of minimum local union troubles. It simply negotiated a clause that provided that the local union waived all rights to bargain about company-wide matters. The question then became whether or not such a clause would stand up in practice. It did in its first case. Here's the story:

For 35 years the company unilaterally maintained, on a uniform 10-plant, company-wide basis, a system of cash awards for employee suggestions accepted by the company. One day an employee submitted a suggestion which the company rejected. About 18 months later, the em-

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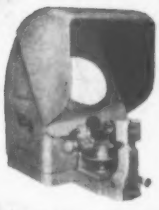

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4 Models

Bench Type
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MODEL 50.12AA
50 TON CAPACITY

This compact Hein-Werner Jack is ideal for moving heavy machinery, pulling gears and pinions, bending pipe, as the power unit for presses, or countless other industrial applications. No crews or helpers are needed. Confusion and wasted man-hours are avoided.

The ruggedly-built Hein-Werner Model 50.12AA packs 50 tons of power. Sturdy handles simplify carrying and positioning . . . fall flush against jack housing when not in use. Tandem pump speeds travel of ram to load. Solid steel base is drilled for installation of pressure gauge. Safety valve prevents overloading. Factory tested at 1½ times rated capacity.

See your industrial supply distributor or write us

Hein-Werner Hydraulic Industrial Jacks are available in models of 1½, 3, 5, 8, 12, 20, 30, 50, and 100 tons capacity. 12 ton and larger models have carrying and positioning handles. Hein-Werner also manufactures "Push and Pull" Hydraulic Jacks of 4, 10, and 20 tons capacity, and "Pushmaster" Hydraulic Jacks of 4 tons capacity.

Hein-Werner HYDRAULIC JACKS

HEIN-WERNER CORPORATION
WAUKESHA • WISCONSIN

PRACTICAL LABOR RELATIONS

Begins on page 146

ployee claimed that the company had in fact used his suggestion, so he submitted it over again. At first, the company accepted the suggestion, but then notified the employee that it had rejected it. Reason: Under the rules a suggestion not accepted within a year could not thereafter be accepted.

The union—the local contractual bargaining agent at the plant—thereupon filed a grievance over the matter. It went through the first three steps of the grievance procedure.

At each step, the company contended that in line with the union contract, the suggestion system was company-wide and was not a matter for local negotiation. It also contended that, in any event, the alleged grievance was not a "grievance," as defined.

Under the terms of the contract in effect, the company was not obligated to bargain concerning any subject deemed to be company-wide.

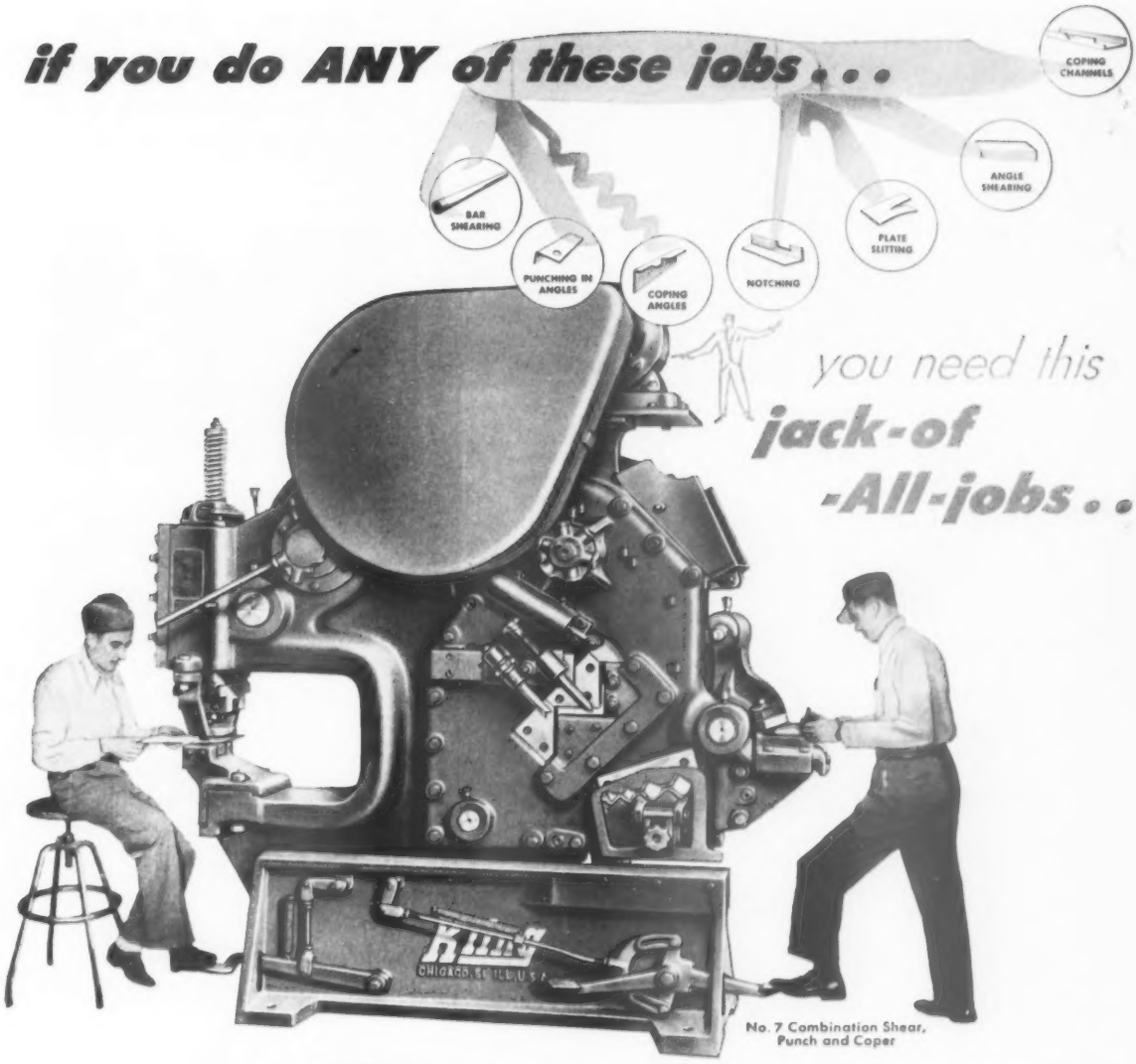
Then the union filed a charge with the National Labor Relations Board that the company had refused to bargain.

The NLRB general counsel refused to issue a complaint. There was no showing of anti-union bias or bad faith.

T-Shirts Become Union Suits

Here's a case where a T-shirt became a union suit. That is, workers of the DeVilbiss Co. were willing to wear T-shirts during a union organizing campaign bearing the union's insignia with the words "vote" or "join" above it. When the employer said "no" to this practice he was held by the National Labor Relations Board to have engaged in unlawful interference, and ordered to permit the wearing of the shirts.

if you do ANY of these jobs . . .



you need this

jack-of -All-jobs . . .

No. 7 Combination Shear, Punch and Coper

the Kling COMBINATION SHEAR-PUNCH-COPER

Remember, when you were a boy, what a hit that 6- or 7-blade jack-knife made? You could do just about everything with it!

This Kling Combination Shear, Punch and Coper will make an equally big hit in your shop. It does any of the jobs shown above, and a lot more. It can turn out the same work as a separate punch, angle shear, bar shear, plate shear and notcher. Best of all, it costs only a few dollars more than a single-purpose punch.

To gain maximum speed and safety, each end operates independently. Foot pedals allow operators to keep hands free to hold work.

In shops of every size, the Kling Combination is speeding production, reducing man-hours, and increasing profits on metal-working jobs. Investigate what it can do for you. Available in 3 sizes, for light, medium and heavy work. Ruggedly built, and meets machine tool precision standards.

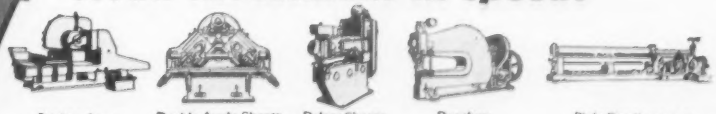
Write for latest FREE *Bulletin No. 347. Gives complete details of jobs this Machine can handle; also capacities, other technical data and specifications.*

KLING BROS. ENGINEERING WORKS
1325 North Kostner Avenue, Chicago, Illinois

Since 1892

Kling

...an investment in speed!



Friction Saws | Double Angle Shears | Rotary Shears | Punches | Plate Bending Rolls

612

Once, rotating pulverizer blades in industrial stokers couldn't stand the grind of abrasive coal. They wore out fast . . . caused costly shut-downs and repairs. A Carboloy created-metal solved the problem—600% better than hard steel could do. Have you a pulverizing wear-problem? Write for free folder.

These pulverizer blades outwear hard steel 6 to 1

Abrasive wear used to be a real bugaboo for one coal stoker manufacturer. His pulverizer blades of steel would crush only 3,500 tons, then had to be replaced.

Recently, he switched to blades faced with ultra-hard Carboloy Cemented Carbide. After pulverizing 22,000 tons—6 times as much as the steel—they showed *no appreciable wear!*

Imagine the savings in downtime, maintenance for users; the great reputation and product-demand this stoker manufacturer is building. Like thousands of other makers of machines or products, he knows that where there's wear, there's usually an ideal spot for Carboloy Cemented Carbide—the same created-metal that has worked production miracles in the die and metal-cutting field.

MEN AND METALS TO SERVE YOU

Cemented Tungsten Carbide is but one of the Carboloy created-metals that might help *you* create better products.

Perhaps you can use new Chrome Carbide, for example, to combat corrosion, along with erosion and abrasion in equipment parts. Or Carboloy permanent magnets to improve your product's design, lower its size, weight, cost. Or Hevimet to build a better balance weight or radiation screen. Find out now. Get in touch with a Carboloy engineer for *all* practical knowledge and help available on these created-metals. Look to Carboloy laboratories, too, for new uses for these created-metals, for exciting new created-metals to come.

Write us today about any of your pulverizing or other special wear problems.

"Carboloy" is the trademark for the products of the Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11135 E. 8 Mile Blvd., Detroit 32, Michigan

First in created-metals for better products

ALNICO PERMANENT MAGNETS
for lasting magnetic energy

CEMENTED CHROME CARBIDES
for exceptional resistance to corrosion, along with erosion and abrasion resistance

CEMENTED TUNGSTEN CARBIDES
for phenomenal cutting, forming, wear resistance

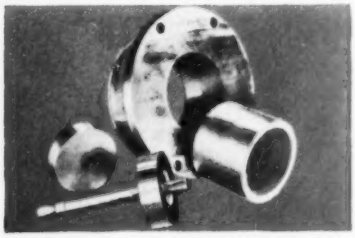
HEVIMET
for maximum weight in minimum space, and for radioactive screening

Plants at Detroit, and Edmore, Michigan

News About Created-Metals

Carbide Molds Last 3000% Longer

Grinding wheel production increased from 2,500 pieces per mold to more than 86,000—that's what Carborundum Co. re-

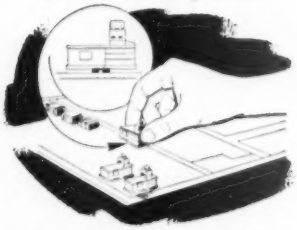


ports after switching to tungsten carbide equipped molds.

Wear-resistant Carboloy cemented carbide inserts were tough enough to withstand the terrific abrasive action of molding, under pressure, silicon carbide and aluminum oxide particles. Molds kept wheel dimensions within specifications; when finally worn, were resized and used for producing larger wheels. Write Carboloy Department of General Electric Company. (See address at left.)

★ ★ ★

Magnets Simplify Machine Layouts



A novel use of Carboloy permanent magnets has been found in simplifying plant machine layout. To eliminate tedious redrawing of machine arrangements, scale models of machines are mounted on tiny magnets and moved about on metal planning board until optimum arrangement is found. Each model holds itself magnetically in place while the others are being positioned. Write the Carboloy Department of General Electric Company. (See address at left.)

★ ★ ★

Revised Bulletin on Chrome Carbide

Recent tests and experiments with chrome carbide have uncovered new facts about its application and its excellent resistance to corrosion, abrasion and erosion.

This information has been incorporated in revised Bulletin WR-104A, bringing it up-to-the-minute on this Carboloy created-metal. For Bulletin write Carboloy Department of General Electric Company. (See address at left.)

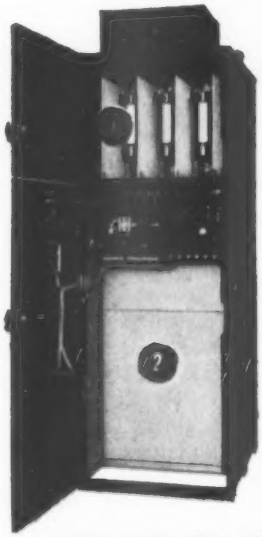
Personnel Protection

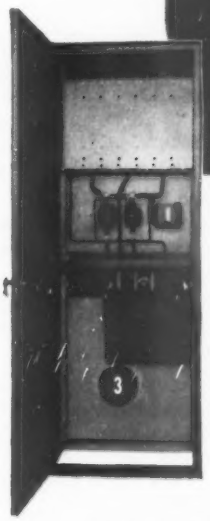
THROUGH SEGREGATED HIGH VOLTAGE COMPARTMENTS

For positive personnel protection, high voltages are completely segregated in the Allis-Chalmers Type H starter. Full width, heavy sheet steel barriers separate the front low voltage compartment from the rear high voltage equipment and from the upper fuse compartment. It will pay you to get all the details from your nearby A-C representative or by writing Allis-Chalmers, Milwaukee 1, Wisconsin.

Type H Starters
FOR 2300 TO 5000 VOLT MOTORS

Current limiting fuses are easily removed with hook stick. Safety door interlocks take motor off line when fuse compartment door is opened.





3 Compartments Assure Safety

The heavy gauge steel cubicle is divided into three compartments for maximum safety. **1** — Upper front compartment encloses disconnect type fuse. The same operation which puts fuse in position for removal isolates starter from line. **2** — Lower front compartment houses low voltage control devices. **3** — Rear compartment contains high voltage equipment, contactors, buses, instruments, transformers, etc.

A-4002

ALLIS-CHALMERS

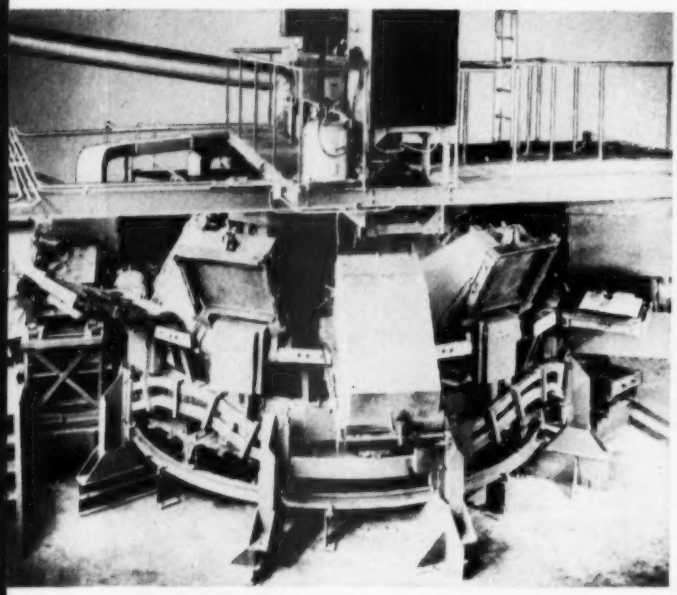
YOU MUSTN'T MISS—

INDUSTRIAL NEWS

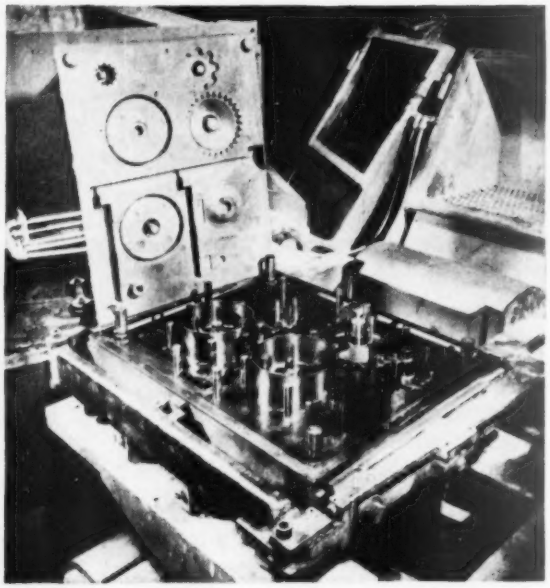
INDUSTRIAL NEWS, BEGINNING ON THIS PAGE

TIMELY HINTS TO BETTER MANAGEMENT

IDEAS TO STIMULATE YOUR THINKING



SHELL MOLDS ARE MADE AUTOMATICALLY on this rotating machine through mold forming, curing, and delivery (far left).



TYPICAL PATTERN at the mold delivery station shows the clean, sharp, accurate molds you can get with the process

Toward an Automatic Foundry

Making molds is only part of a total foundry operation, but it's an important part, normally requiring considerable labor. Now comes a new machine that makes automatic mold production a reality—500 molds per hour, with one operator.

A 12-station unit designed and recently built by Mechanical Handling Systems, Inc., Detroit, will produce the plastic foundry molds, or shell molds as they are called (FACTORY, December 1951, p. 234). Each mold is used only once. It's destroyed when you break it away from the finished casting.

How the machine works. A mixture of sand and resin falls from a hopper onto the pattern and pattern carrier. The carrier—one of 12—rotates through an oven where the sand-resin mixture becomes fused and flows to cover the pattern. By the time the mold has completed its circular journey, it's hardened and fully cured. A mold release pin lifts automatically, the mold is removed, and the cycle begins again.

Proportioning. At the top of the machine is located an automatic proportioning system for sand, resin, and wetting agent. The materials are thoroughly mixed and deposited in controlled quantities in the hoppers as the machine revolves counter clockwise.

Patterns. You can change pattern plates quickly, without stopping the machine. You can have all 12 units producing the same pattern or 12 different ones. Maximum pattern size on the standard machine is 28 x 22 inches. *Turn the page*

All Hands are "TOP HANDS"

...when they work with SIMONDS "RED END" Hacksaw Blades

It's fast, easy cutting on any material . . . when the hand-frame holds the right "Red End" Blade for the job. That's why those who know, insist on the blade with this famous trade-mark.

On the economy side, Simonds "Red End" Blades are uniformly hardened for better cutting performance and lowest cutting costs. What's more, teeth are accurately milled and precision-set . . . for straighter cutting and longer life. And Simonds offers a choice of three types of blades — Standard, Molybdenum or High Speed Steel — Hard Edge or All Hard — to provide a "right" blade for your job.

Get delivery from stock from your Simonds Distributor.

For PROMPT DELIVERY and PERSONAL SERVICE . . . call your INDUSTRIAL DISTRIBUTOR

SIMONDS SAW AND STEEL CO.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

When you look at air tools . . . LOOK INSIDE

THE OLD WAY

A two-piece shaft, with male and female tang drive; double bearings required at center of tool.

THE NEW WAY

A one-piece shaft, with keys to drive the rotor which "floats" on the shaft; only one bearing needed at center of tool.

An ordinary air tool has a two-piece shaft, joined by a male and female tang. This tang drive is subject to excessive wear, even when double bearings are used for support. When wear occurs, it means replacement of the entire shaft, and an expensive rotor.

A Buckeye air tool has a one-piece shaft, connected to the rotor by two keys; the rotor "floats" on the shaft. The keys are not subject to as much wear as the tang drive, and even when wear does occur, the keys are easily replaced at very low cost. The shaft and rotor continue in service.

The point is simply this: you can expect better service—at lower cost—from your Buckeye tools.

What are you waiting for?

Buckeye Tools CORPORATION

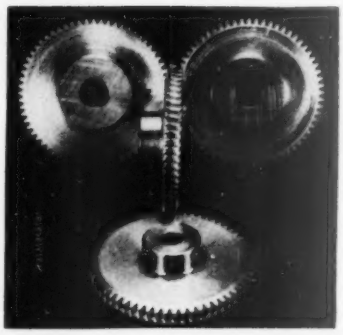
DIVISION 13 • DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

YOU MUSTN'T MISS—

Begins on page 158



CHEMICALLY PLATED steel gears. One mil of nickel on each.

Metal Plating With Chemicals Only

You can plate precise thicknesses of metal on just about any metal and many other materials with a new chemical process announced by General American Transportation Corp., Chicago.

With its Kanigen process, says the company, you can:

- Plate small, irregular-shaped parts—difficult to plate by electrolytic means.
- Plate close-fitting parts to predetermined precision tolerances. You can control coating thickness to 0.0001 inch.
- Plate any basic metal with thin corrosion-resistant coatings of nickel or similar metals. The coatings are said to have zero porosity, preventing corrosion of the base metals.

Cost • For thin coatings, Kanigen is more economical than electroplating, the company says. The economic advantage decreases with coating thickness.

Though Kanigen could plate out many metals, only nickel plating is being done at the moment. Big savings in hard-to-get nickel are possible. To get comparable coatings, you need about half as much nickel as with conventional electroplating.

Equipment needed • All that's

B SERIES • Light duty, one direction ball thrust bearing. Flat seat. Flat races. Bronze ball retainer . . . 38 sizes ½" to 3½" I.D.

C SERIES • Light duty, one direction ball thrust bearing. Flat seat. Flat races. Pressed steel retainer . . . 16 sizes ½" to 1¾" I.D.

F SERIES • Light duty, one direction thrust bearing. Flat seat. Grooved races. Pressed steel retainer . . . 43 sizes ½" to 3½" I.D.

G SERIES • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 76 sizes ½" to 7¾" I.D.

E SERIES • Medium duty ball thrust bearing. Banded. Flat seat. Grooved races. Full complement of balls . . . 40 sizes ½" to 3½" I.D.

1000 SERIES • Light duty ball thrust bearing. Flat seat. Grooved races. Pressed steel retainer. Metric standard . . . 26 sizes 10 to 125 mm. I.D.

1100 SERIES • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 23 metric sizes 10 to 140 mm. I.D.

1400 SERIES • Medium duty. Grooved races. Spherical seat. Pressed steel or bronze (large sizes) retainer . . . 23 metric sizes 10 to 140 mm. I.D.

W SERIES • Case hardened and ground flat washers for various Thrust and Spacer applications. Slip fit. 38 sizes ½" to 3½" I.D.

R SERIES • Ball thrust retainer. One piece, pressed steel, channel type cage . . . 79 inch sizes 0.266" to 4.232" I.D.

Just Name Your Need

Whatever mechanized equipment you make or use—whether it is large, small, rugged, fragile, heavy or light—whether it must operate at high speed, low speed, under water, in acid or under extreme temperature or dust conditions, it will do its job better, more efficiently and more economically if bearing equipped. If it is equipment that lends itself to bearing applications of the thrust type—Aetna has the answer or can come up with it pronto. 37 years of thrust bearing know-how assures this. Inquiries invited. No obligation. Aetna Ball and Roller Bearing Company, 4600 Schubert Ave., Chicago 39, Illinois.

Aetna

Precision Bearings and Parts for Every Branch of Industry

CLUTCH BEARINGS • Ball thrust clutch release bearing. Banded. Pre-lubricated. T-type, oil impregnated bronze retainer assures concentricity and smooth, quiet, long-life performance.

SPECIAL BEARINGS • Facilities for sizes up to 38" O.D. Counsel that brings you the expert technical aid that has licked many of industry's toughest bearing application problems.

PRECISION PARTS • Aetna is versatile—can mass-produce vital parts in almost limitless sizes and shapes—to your most exacting metallurgical, tolerance and finish specifications.

Write **for latest catalog. Contains specifications on Aetna's complete line—vital technical reference data on bearing selection, load capacities, lubrication, care and maintenance.**

BRANCH OFFICES COAST-TO-COAST: • Albany • Atlanta • Auburn • Baltimore • Binghamton • Birmingham • Boston • Bridgeport • Buffalo • Charlotte • Chicago • Cincinnati • Cleveland • Denver • Detroit • Hartford • Houston • Jacksonville • Los Angeles • Newark • New York • Niagara Falls • Philadelphia • Pittsburgh • Providence • Richmond • Rochester • San Francisco • Seattle • Syracuse • Trenton • Utica • Waterbury • Worcester. *See your classified 'phone directory for addresses.*

*Snap-on VACUUM GRIP PLIERS ...the *right* pliers for every job!

● Choose from more than 30 Snap-on types and sizes. Each is built to perform its specific gripping, cutting or twisting function *faster, easier, more safely* than any other pliers. Snap-ons are heat-treated from surface to core and the jaws, cutting edges and joints are locally tempered to exact degree of hardness and toughness for greatest durability. Write for catalogs described above. Snap-on branch warehouses in 42 industrial centers offer direct factory service to industry everywhere.

SNAP-ON TOOLS CORPORATION
8044E 28th Avenue, Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

YOU MUSTN'T MISS—

Begins on page 158

required are some inexpensive racks or hangers and special acid-resistant equipment for handling the plating solution.

Availability · General American is going to license companies to use Kanigen, once it makes certain that all mass production problems are licked. It's now building plants in East Chicago and Los Angeles, where chemical plating will be done on contract.

Cutting Costs on Structural Shapes

Cheaper structural shapes are on the way, thanks to a relatively new hot-extrusion process using fibrous glass as a lubricant (FACTORY, July 1952, p. 246). For short runs of special shapes, mills can use dies rather than go to the expense of custom building costly special rolls.

According to U. S. Steel's National Tube Div., Gary, Ind., the process also makes possible a great variety of special shapes; smaller outside diameter tubing; extremely long lengths; and extrusions in tube form or structural shapes of stainless alloys not pierceable with conventional equipment.

People: Biggest Factor in Your Future

The biggest single factor in the future of your business is the growth of U. S. population. And you can't plan for the future without considering just how many Americans needs you'll have to satisfy.

These conclusions come from *York Report*, a monthly newsletter published by York Engineering & Construction and York-Gillespie Mfg. Companies, Pittsburgh.

On a conservative estimate American population will rise to

Customer Reports:

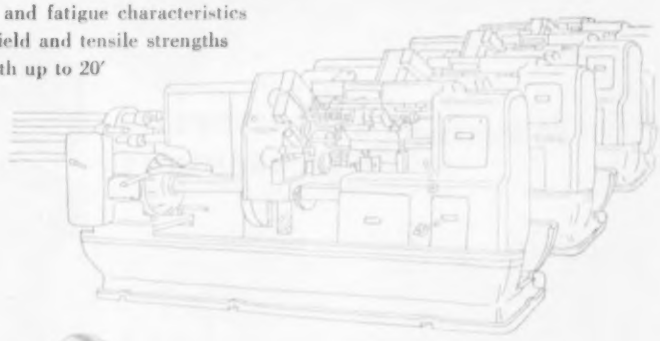
Asarco Continuous-Cast Bronzes Machined at Over 1,000 Feet Per Minute

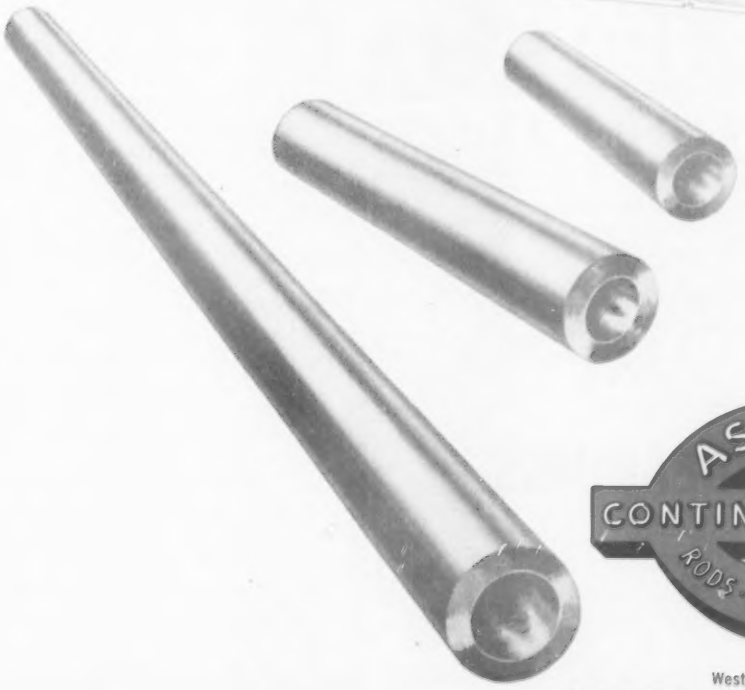
WORTHINGTON CORPORATION has jumped machining speeds on shaft bushings and pump sleeves by using ASARCO Continuous-Cast Bronzes instead of foundry-cast bronzes. In some cases over 1,000 surface feet are machined per minute.

Worthington has used very substantial quantities of ASARCO Continuous-Cast Bronzes during the last three years in a variety of alloys and sizes. Tool life is longer despite high cutting speeds. Products are improved because ASARCO stock has greater uniformity than conventional foundry products, and its even dispersion of lead particles provides superior bearing surfaces.

ASARCO Continuous-Cast Bronzes are entirely free from porosity, and from hard and soft spots . . . are ideal for use on automatic screw machines. No sand, dirt, dross or other foreign matter is trapped in the stock to harm tools or discourage high cutting speeds. Dimensions are so precise that many machining operations are eliminated and waste is at a minimum. Impact and fatigue characteristics are up to 100% better than those of sand-cast bronzes. Yield and tensile strengths are superior, too. Stock is available in any length up to 20′ to meet individual requirements.

REDUCE MACHINING TIME! . . . IMPROVE PRODUCTS! . . . CUT SCRAP LOSSES! BUY ASARCO Continuous-Cast Bronzes and get bronzes with superior properties in the exact sizes you need.





ASARCO CONTINUOUS-CAST RODS · TUBES · SHAPES ®

West Coast Sales Agent:
KINGWELL BROS. LTD., 457 Minna Street, San Francisco, Calif.

American Smelting and Refining Company

OFFICES: Perth Amboy Plant, Barber, New Jersey
Whiting, Indiana

WHY
buy a special bearing if you can get one READY MADE?
Over 900 sizes
JOHNSON GP SLEEVE BEARINGS
The wide selection of over 900 sizes of Johnson GP (General Purpose) Cast Bronze Bearings will suit 90% of industrial applications. They are precision finished to standard tolerances, in many cases ready for immediate installation. Manufactured in standard stock sizes, all pattern and set-up costs have been absorbed, making them extremely low in cost. Many manufacturers find that they save money and valuable time by adopting Johnson GP Sleeve Bearings for their products. Your local Johnson distributor carries a full line of sizes. Contact him now. The new Johnson Bearing Catalog lists complete line of sizes. Write for your copy.
JOHNSON BRONZE COMPANY
512 South Mill Street · New Castle, Pa.
JOHNSON B BEARINGS
Sleeve Type
ELECTRIC MOTOR
UNIVERSAL BRONZE BARS
LEDALOYL Self-Lubricating
CAST BRONZE GRAPHITED

YOU MUSTN'T MISS—

Begins on page 158

193-million by 1975, the report predicts. So more factories and more machines will be needed to meet expanding demand. Annual plant improvement outlays of close to $40-billions will probably be commonplace 20 years from now, the report concludes.

Jobhunt Guide for High School Grads

Jobhunting in Cincinnati is going to be easier for both high school graduates and local industry this year. The ex-students will have a good idea which companies they want to work for. And industry's personnel people won't have to waste time talking to boys and girls who aren't really interested.

The reason · All this and more is made possible by a 120-page book called "Decision" that's distributed free to high school graduates. It describes job opportunities at 66 companies in the Cincinnati area. It tells what companies want and don't want in their employees. It even gives directions on how to apply for a job at each plant.

How it works · Companies buy space in the book—from one to 4 pages—at $200 a page. In that space they broadcast their story to the high school grad labor market. This year Decision, Inc., Cincinnati, the publisher, guaranteed that each company's message would get to at least 5000 jobhunting graduates.

How it was received · Cincinnati educators are enthusiastic about the idea, feel it's a swell way to help students. Industry appears to like it just about as well. Some 95% of Cincinnati's top-drawer companies bought space in "Decision."

The future · Work is already underway to establish a similar book in 10 other cities before 1954.

If...the average Lyon Steel Equipment Dealer dressed to represent every kind of customer he serves—he'd be wearing quite an outfit!

for Lyon makes over 1500 different items—serving hundreds of markets including factories, shops, offices, warehouses, schools, churches, hospitals, clubs, institutions and homes.* (A very few typical Lyon Products are shown below.)

**Facilities also available for special contract work*

FACTORIES IN . . . AURORA, ILL., AND YORK, PA.

LYON METAL PRODUCTS, INCORPORATED

General Offices: 512 Monroe Avenue, Aurora, Illinois

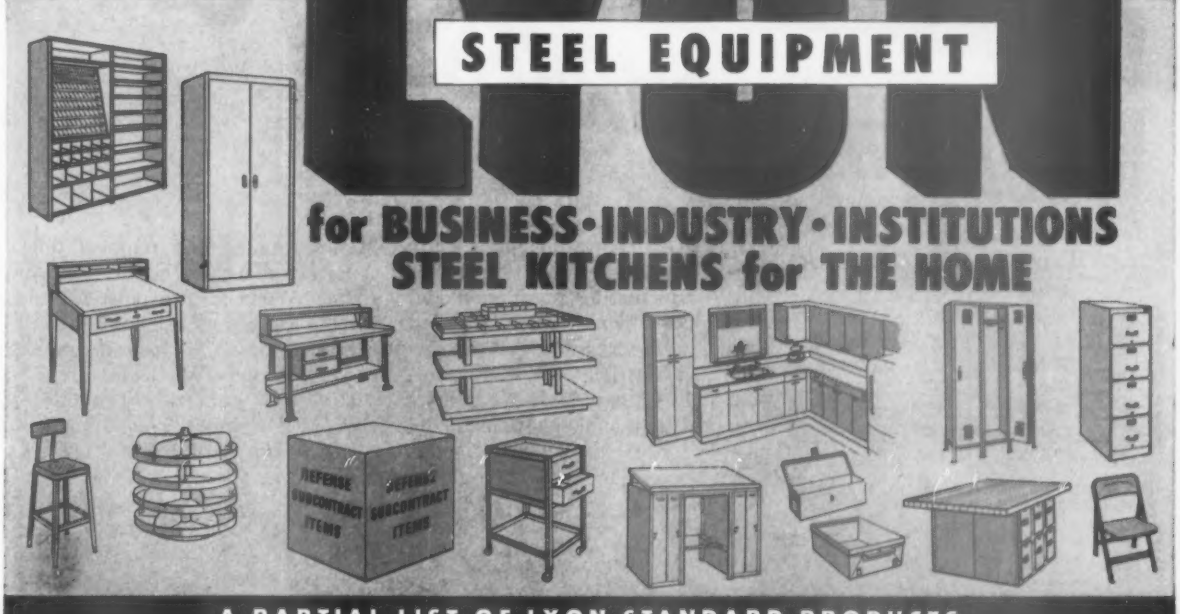
Sold Nationally Through Dealers and Branch Offices

LYON®

STEEL EQUIPMENT

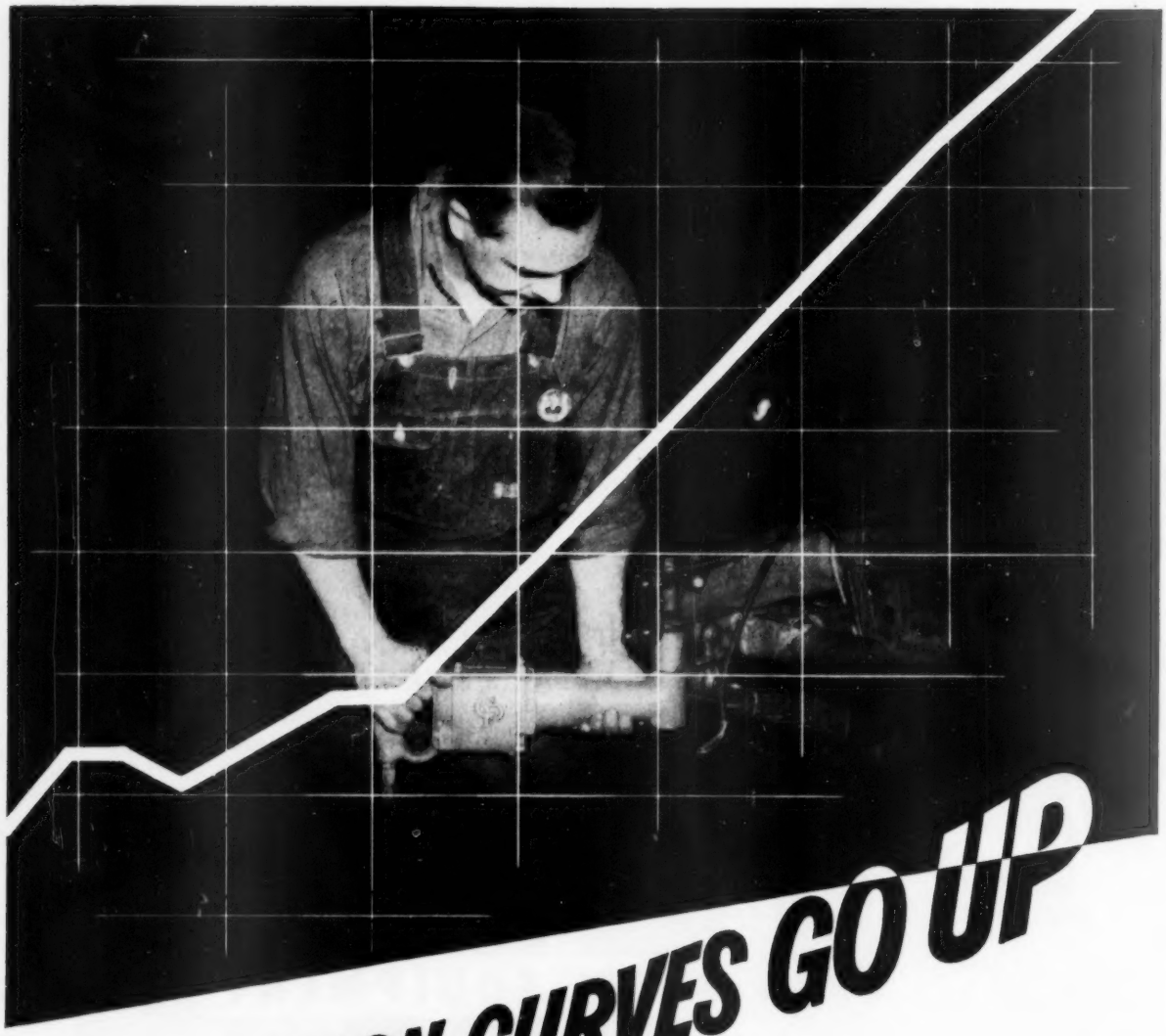
for BUSINESS·INDUSTRY·INSTITUTIONS

STEEL KITCHENS for THE HOME



A PARTIAL LIST OF LYON STANDARD PRODUCTS

- Shelving
- Lockers
- Stools
- Bin Units
- Kitchen Cabinets
- Cabinet Benches
- Storage Cabinets
- Drawing Tables
- Tool Toters
- Bar Racks
- Tool Boxes
- Parts Cases
- Economy Locker Racks
- New Freedom Kitchens
- Toolroom Equipment
- Wood Working Benches
- Display Equipment
- Flat Drawer Files
- Revolving Bins
- Hanging Cabinets
- Filing Cabinets
- Folding Chairs
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks



PRODUCTION CURVES GO UP

CAPACITIES	BOLT SIZE
CP-337	¼"
CP-344	⅜"
CP-3440	⅜" heavy duty
CP-349	½"
CP-360	¾"
CP-3630	¾" heavy duty
CP-365	1¼"
CP-375	1¾"

Today's cost control and time study experts are always on the alert for ways of increasing production and cutting costs. That's where Chicago Pneumatic's reversible Air Impact Wrenches can help out. CP's complete line of reversible air impact wrenches with angle-head models in all sizes for reaching awkward, hard-to-get spots save from 25 to 75% of nut running and removal time.

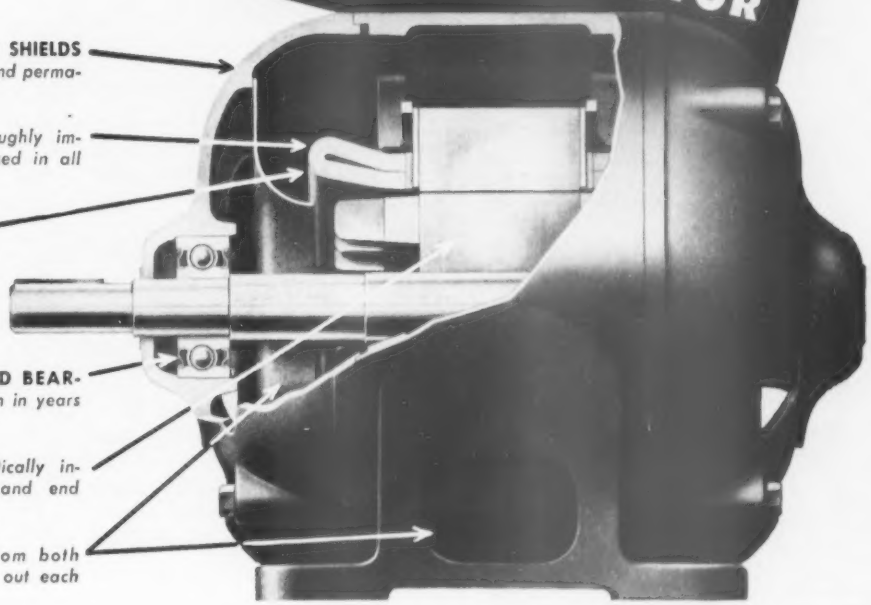
Fast and easy-to-handle CP Air Impact Wrenches are powerful and smooth operating without fatiguing torsional thrusts . . . have adaptable power regulators. Available with side, pistol grip or straight handles. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Reliable?— well, check these features in the...

ELLIOTT SQUIRREL-CAGE INDUCTION MOTOR



RIGID GRAY IRON END SHIELDS *for solid bearing support and permanent alignment.*

VINYLASTIC WIRE *thoroughly impregnated and baked, used in all stators.*

CORDED END TURNS *for strength and permanence and phase-to-phase insulation to give further assurance of long life.*

SEALED PRELUBRICATED BEARINGS *needing no attention in years of service.*

ALUCAST ROTORS *practically indestructible — bars, fans and end rings are one solid piece.*

DUAL VENTILATION *from both ends of rotor, discharged out each side of the frame.*

Isn't this what you want in a good general-purpose motor —one that will require no babying nor special attention while in service on machine tool, process apparatus, fan, blower or pump? Here is sound dependability based upon solidly established past performance in applications of all kinds. Here is a motor that has passed every service test, thousands of them, tough as they come.

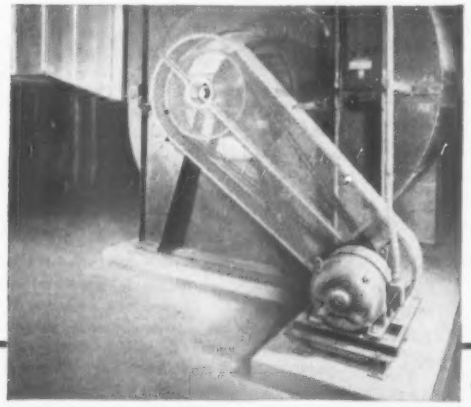
Another thing—this motor with all its rugged qualities, is available in all standard mountings—horizontal C face mounting, frame with feet — vertical flange mounting, with built-in C-W brake, in open drip-proof or splash-proof enclosure. In NEMA frames 203 through 505.

Put this Elliott Crocker-Wheeler motor wherever you want it, and say good-bye to motor troubles.

For full data on this and other Elliott C-W motors, contact your local Elliott field engineer or write Elliott Company, Jeannette, Pa.

RIGHT FOR AIR CONDITIONING

Here is one of 95 of these C-W motors in a new air-conditioned skyscraper. This one of 15 hp, drives a big return fan.



ELLIOTT Company

CROCKER-WHEELER DIVISION

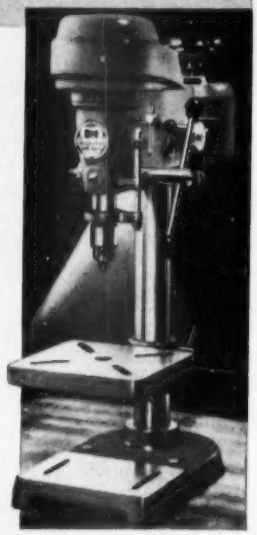
W3-2

ECONOMY

14"
South Bend Economy Model Bench Drill Press

Ruggedly constructed for machine shop service. Drills to center of 14-1/4" circle. Free-floating spindle. Four precision ball bearings. Time payment plan is available.

PRECISION



For greater precision, maximum convenience and more satisfaction select the South Bend Precision Model 14" Drill Press. Has built-in work light, free-floating spindle, four precision ball bearings, adjustable quill bearing, quick-acting belt tension release. 1/3 or 1/2 h. p. vertical mounting motor required. Time payment plan available.

South Bend also makes several types of multiple spindle drill presses for production operations — write for information.

Write for catalog of 14" Drill Presses. Also, 9" to 16-24" Lathes, Lathe Attachments, 7" Shapers — specify machine interested in.

SOUTH BEND LATHE
South Bend 22, Indiana
Building Better Tools Since 1906

Good Ways to Solve Special

PLANT ENGINEERING PROBLEMS

277 HOW NOT TO CLEAN CLAD-STEEL EQUIPMENT: Lukens Steel Co. has a 10-page booklet packed with the answers. You'll find recommended cleaning procedures for harmful types of surface contamination and for specific kinds of surfaces.

278 NEED SPECIAL-SHARPED STRAINERS OR WIRE FILTERS? Multi-Metal Wire Cloth Co., Inc., says it will build them for you. You just tell the company what you want. They go on from there. Bulletin No. 531 shows how.

279 WHY FLANGED PIPE JOINTS FAIL: You'll find the answer on page 11 of "Modern Steel Bolting for Piping and Pressure Vessels," offered by Taylor Forge Pipe Works. Other useful information for anyone who selects bolting for piping and pressure vessel service.

280 HOW TO STOP PIPE DRIP from cold water lines: One way is to use spray-applied cork and Gilsonite mastic insulation, says Insul-Mastic Corp. of America. A 4-page folder contains charts showing the exact degree of protection from condensation Type "D" insulation gives you.

281 TO AVOID CORROSION OF STAINLESS STEEL WELDS Armco Steel Corp. suggests its extra-low carbon electrodes. Cost less than grades containing scarce corrosion-resistant metals. And you can use them at temperatures up to 800F.

282 TO AVOID MILDEW AND MOLD ON PAINTED WALLS, Monsanto Chemical Co. suggests you try its chemical additives. Three types for use with many types of paint will protect either before or after finish coat is applied on interior or exterior walls. Bulletin No. 11652 H.

283 HOW TO CURE SPRAY-BOOTH TROUBLES: You can use Electronic Control Dispensers to cut maintenance labor costs, prevent damage to reclaimable sludge, and reduce rejects due to improper cleaning, says The Du Bois Co. bulletin.

284 TO KNOCK THE TAR OUT OF RE-ROOFING COSTS, use its cold-process method, says Tropical Paint & Oil Co. Unskilled labor can do the job without special equipment. And there's no fire hazard. Improved adhesion and elasticity in the coating.

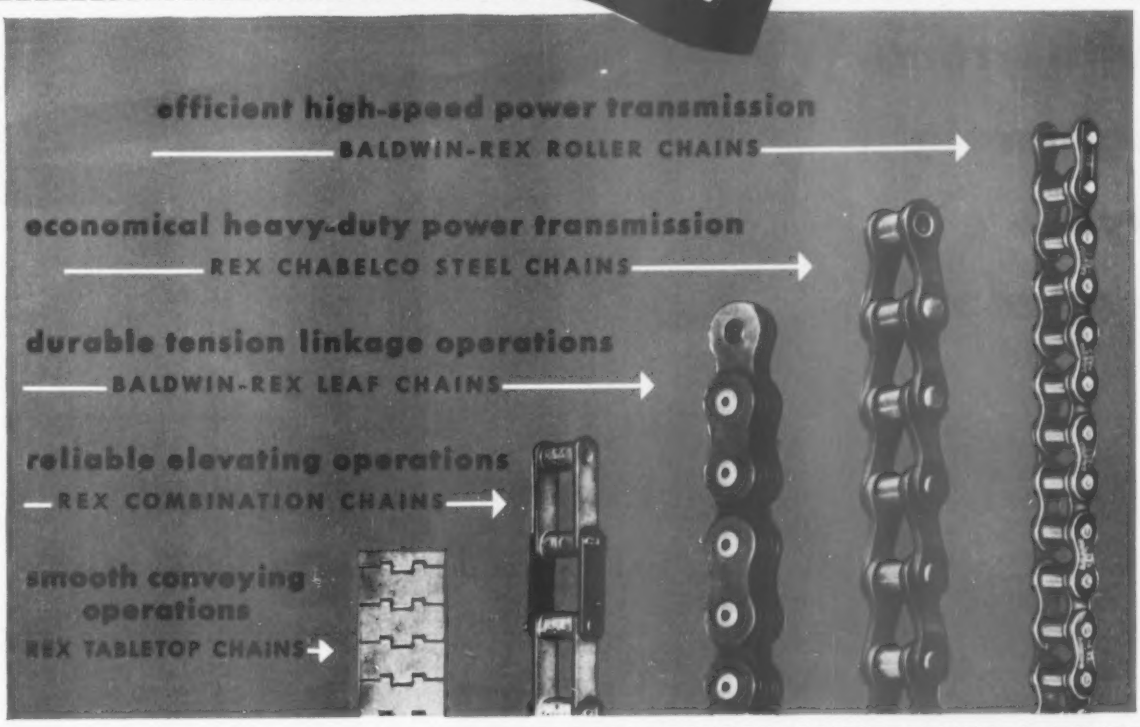
285 IF YOU'VE GOT AN UNSOLVED DUST PROBLEM, it may pay to look into Roto-Clones. American Air Filter Co. says its 16 variations of dust-control equipment are made for the difficult jobs. The standard equipment can be easily adapted to your needs.

286 HOW TO SOLVE YOUR HUMIDITY PROBLEM? Air Condioning Div. of Remington Corp. says it has the answers. Simple step-by-step instructions for solving moisture removal problems with dehumidifiers. You learn principles of selection and operation from case histories in the folder.

287 HOW TO RESURFACE A HEAVY-DUTY FLOOR FAST: Use Swift-Floor, says Monroe Co., Inc. It's said to withstand 50,000-lb. loads 60 seconds after it's tamped or rolled to a smooth surface. Easy to apply. Just prime the old floor surface first.

To get these catalogs, circle number on reader's service postcard next to back cover, Part Two.

what'll you have?



Chain Belt's Got it!

Yes, whatever your requirements for power transmission or conveyor chains, Chain Belt has the exact size and type you need for most efficient, economical operations.

There is no one chain that's right for all applications...there is a *right* chain for each application. That's where it pays you to choose from the complete Chain Belt Line. You cut costs...and get the most out of your machines and conveyors. Don't take chain for granted. Check over the chain application in your plant today, and with the help of your Chain Belt Field Sales Engineer, see where you can cut costs—in chain selections.

For helpful information, mail the coupon.

REX BALDWIN-REX

Chain Belt COMPANY OF MILWAUKEE

Atlanta • Baltimore • Birmingham • Boston • Buffalo • Chicago
Cincinnati • Cleveland • Dallas • Denver • Detroit • El Paso • Houston
Indianapolis • Jacksonville • Kansas City • Los Angeles • Louisville
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Distributors located in principal cities in the United States and throughout the world
EXPORT OFFICES: Milwaukee and 19 Rector Street, New York City.

CHAIN BELT COMPANY 53-504-A
4667 West Greenfield Ave., Milwaukee 1, Wis.
Gentlemen:
Please send me information on Rex and Baldwin-Rex chains
☐ For power transmission ☐ For conveying ☐ For tension linkages
☐ Slide rule drive selector for slow to medium speeds.

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Firm.....
Address.....
City.....*Zone*.....*State*.....

NEW WILLSON Kover-Mor Goggles

with strong, lightweight nylon eye cups

NOTICE THE RIGID METAL TOP BAR

—standard on Willson Kover-Mor Goggles. Makes them easier to handle—holds them firmly in place. Two-piece adjustable headband and leather nose-and-bridge curtain also contribute to more comfortable fit.

Ask your Willson distributor for new Kovnr-Mor* Cup Goggles

*Trademark

Fit easily over modern prescription glasses–use standard 50 mm. round lenses

They offer many benefits to workers in hazardous occupations—

improved design . . . provides snug, comfortable fit—ample room over modern large-frame prescription glasses.

nylon eye cups . . . molded of tough lightweight nylon—strongest plastic used in goggle cups; non-flammable—and won't conduct heat.

standard lenses . . . 50 mm. round flat Super-Tough* lenses used eliminate need to stock odd size replacement lenses—external lens retaining ring makes lens replacement quick and easy.

extra ventilation . . . two-way ventilation is provided by slots in retaining ring and screens in eye cups.

new lightweight comfort . . . total weight of these new goggles is practically the same as smaller "cover all" styles.

More Than 300 Safety Products Carry This Famous Trademark

WILLSON®

Established 1870

WILLSON PRODUCTS, INC. • 218 Washington Street • Reading, Pennsylvania

How much *can V-Belt Preventive Maintenance* SAVE?

When you make belts last longer you save on *belts*, of course. *But that's not all!* In fact, the *real* saving almost always is many times the cost of the belts.

A chemical company, for example, has a V-Belt drive on a mauler mixer that is exposed to continuous grit from crushed rock, which is treated with sulphuric acid. This is what a belt change costs:

Cost of new belts	**$ 20.20**
Cost of labor	**2.25**
Cost of lost production during down time	**1000.00**
Total cost of belt change	**$1022.45**

On installations such as this, Preventive Maintenance on V-Belt drives really pays off.

Dayton V-Belt Survey Experts often can extend the time period between belt changes by 50%—through installing Dayton V-Belts. The savings on belts, of course, is worthwhile. *But the real pay off comes in the elimination of costly down time through Dayton's Preventive Maintenance Program.*

Find out what BIG savings you can make with Dayton V-Belts and Preventive Maintenance. Call your Dayton Jobber for further details. He's listed under "Belting" in your local telephone directory. Give him a ring and he'll be glad to help you solve your V-Belt problems.

DAYTON RUBBER COMPANY • DAYTON 1, OHIO

Dayton Rubber

Since 1905

WORLD'S LARGEST MANUFACTURER OF V-BELTS

© D.R. 1953

"THIS LUBRICANT REDUCES SERVICE CALLS"

—says LYNCH CORPORATION
Toledo, Ohio

"LUBRIPLATE greatly reduces unnecessary wear and prolongs the life of machines. It has reduced customer calls for service to a minimum. Our Service Engineers can readily spot machines that have had other than LUBRIPLATE Lubrication, as these machines do not give the service they should."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

Good Ways to Solve Special
PLANT OPERATING PROBLEMS

288 HOW TO OPERATE A CRANE: That's the title of Electric Controller & Mfg. Co.'s 44-page pocket-size manual. You'll find it helpful for the seasoned operator as well as the beginner. Includes safety rules and inspection guide for daily report.

289 FOR HANDY HINTS ON PAINT STRIPPING, Octagon Process Inc. has a 13-page booklet of instructions. Detailed data on 11 types of strippers for practically any finish on metals and woods.

290 FOR BIG SAVINGS IN FINISHING, you'll want the right combination of finishing systems and equipment. Cincinnati Cleaning & Finishing Machinery Co. has a 16-page booklet to help you select. Covers many different sizes and types of parts, many finishing processes.

291 TO FEED SOLIDS AT CONSTANT RATES, Richardson Scale Co. has a constant-weight continuous feeder that automatically controls depth of material on the belt. You can pre-set your rates at up to 3000 pounds per minute. Less than $\pm 1\%$ error during any 2-minute run.

292 GOT A TUBE STRAIGHTENING PROBLEM? You can solve it with Rotary Straighteners, says Mackintosh-Hemphill Co. Technical Bulletin No. 52 describes case histories of seven companies where the straighteners helped boost production on from $\frac{1}{8}$-in. non-ferrous tubing to 4-in. steel pipe.

293 TO HELP YOU UNDERSTAND ELECTRONIC CONTROLS — photocell controls, anyhow — Woerner Electronic Devices says you might take a look at its Bulletin No. 1252. Tells how to select and use for packaging, supervision of automatic production, sorting, inspection, and other operating jobs.

294 IF BAG HANDLING'S YOUR PROBLEM, you may find the solution in The Elwell-Parker Electric Co.'s 8-page booklet. Illustrates various methods of handling with trucks and special attachments, shows how to unload, stack within a building, make inter-departmental and inter-building moves, and lots more.

295 TO HELP YOU KEEP UP WITH THE TREND TOWARD BETTER DOCKS for more efficient receiving and shipping, why not consider Adjust-a-Dock and Adjust-a-Truck, says Rowe Methods, Inc. The former bridges the difference in height between docks and rail cars and highway trucks. The latter can be used where you don't have enough room for adjustable dock ramps.

296 TO SOLVE SPECIAL SOLDERING PROBLEMS, Joyal Products Inc., suggests its AN Connector soldering machine. You can use it on terminal boards, on printed circuits with high temperature solder that can't be handled with a soldering iron, and for military equipment on solder-crimped lugs. Easy to use.

297 WHAT'S YOUR FASTENING PROBLEM? Maybe you'll get some new ideas from this brochure showing Bostitch fastening equipment in operation. Staplers, tackers, stitchers for a variety of materials and applications.

To get these catalogs, circle number on reader's service postcard next to back cover, Part Two.

SLASH PUMPING "down time!"

You slash pumping "down time"—when you have a pump that requires minimum maintenance . . . when the parts are easily accessible when maintenance is necessary . . . when you have a Fairbanks-Morse Split-Case Centrifugal Pump!

See how easily this sturdy pump is inspected . . . lift the split casing and the entire rotating element can be removed without disturbing driver or pipe connections . . . even the bearings can be removed without use of a bearing puller!

See your Fairbanks-Morse Branch Pump Engineer on this Split-Case Single-Stage Centrifugal and the rest of his complete pump line. Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY
RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

on your nut setting operations...

One-piece, precision-built Apex SN Nut Setters offer several advantages not found in two-piece socket-extension combinations. Power is applied direct from gun to work . . . full torque is developed . . . operation is faster, safer—and easier on tools and on tool operators. There are no movable parts, joints or locking devices to cause vibration, backlash and excessive loss of torque.

Apex SN Nut Setters are available with the following hex shank drives—¼" (standard and bolt-clearance type); 7/16", 5/8" and ¾" (standard type). Broached openings, Hexagon: 3/16" to 1½"; Square: ¼" to 5/8". If your power tools take a hex shank, you can use Apex SN Nut Setters on your work, and save time, money and manpower—now!

CATALOG 29 contains complete information, specifications and illustrations of over 5,000 Apex impact sockets, extensions, adapters, universal joints and other production tools. Write, on your company letterhead please, for your copy.

APEX TOOLS

sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY
1025 S. Patterson Blvd., Dayton 2, Ohio

POWER BITS, INSERT BITS AND BIT HOLDERS, FOR PHILLIPS, FREARSON (Reed & Prince), SLOTTED, CLUTCH HEAD and SOCKET HEAD SCREWS • HAND DRIVERS FOR PHILLIPS, FREARSON AND CLUTCH HEAD SCREWS • TWO-PIECE DRIVERS FOR HEX HEAD SCREWS • SOCKETS, EXTENSIONS, ADAPTERS AND NUT SETTERS • UNIVERSAL SOCKETS, EXTENSION WRENCHES AND ADAPTERS • AIRCRAFT AND INDUSTRIAL UNIVERSAL JOINTS • SELF-RELEASING AND ADJUSTABLE STUD SETTERS • SAFETY FRICTION TAPPING CHUCKS • VERTICAL FLOAT TAPPING CHUCKS.

...with TYCOL lubricants on hand!

Heavy-duty cutting operations? Here's what happens when you switch to Tycol Afton oils! A well known Engineering Company (you'd recognize the name instantly) recently tested cutting oils used to shape 14″ gears on a Gleason Bevel Gear Generator. Their findings: after the first rough cut around, with competitive oils, they had to grind a full ⅛″ off the cutter. With Tycol Afton 8, they hobbed *two* gears and took off only .013″. Afton oils are non-corrosive . . . and so stable they're widely recommended as hydraulic oils! They serve a triple function as coolants, lubricants, and hydraulic media on the same machine . . . the heavier the cut — the better they perform. It will pay you to find out why — by contacting your local Tide Water office!

Over 300 Tycol industrial lubricants are at your disposal . . . engineered to fit the job!

REFINERS AND MARKETERS OF VEEDOL . . . THE WORLD'S MOST FAMOUS MOTOR OIL

TYCOL
INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
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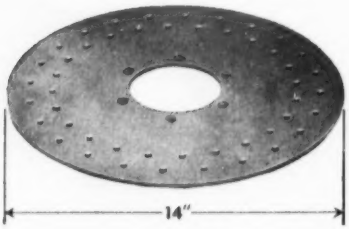
Toronto, Canada

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE - NEW YORK 4, N.Y.

ELECTRICAL INSULATION THAT CAN BE MADE TO THE SAME TOLERANCES AS STEEL

YES, we *do* mean *any* tolerances that can be produced in steel.

For example:



Two of these 14" Mycalex 400 discs revolve with only .004" clearance. Dimensionally stable, too. Mycalex *stays* accurate.

Mycalex glass-bonded mica is found in *HIGH PRECISION* electrical components.

WRITE FOR ENGINEERING DATA BOOK

SINCE 1919 MYCALEX THE INSULATOR ®

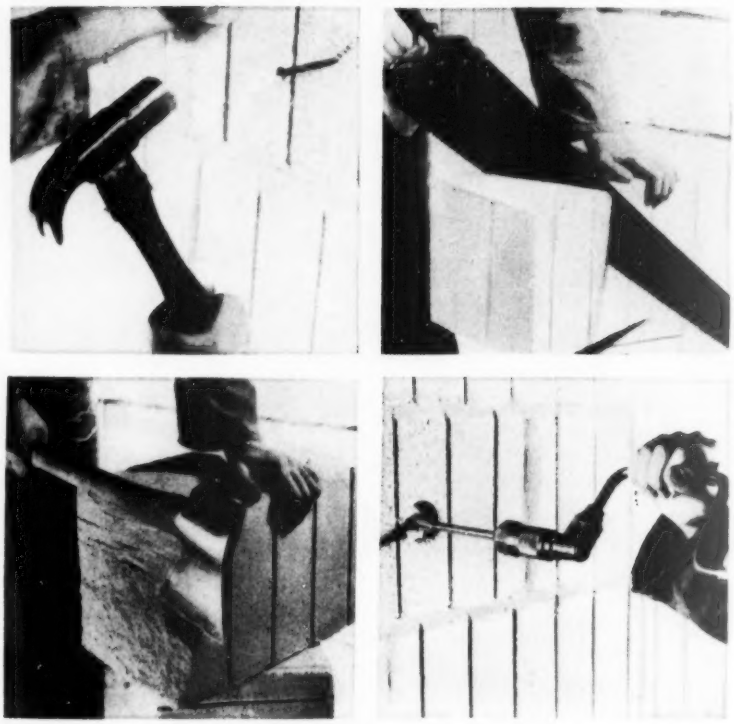
MYCALEX CORPORATION of AMERICA

Owners of "MYCALEX" Patents and Trade-Marks

Executive Offices: 30 Rockefeller Plaza, New York 20, N.Y.

GENERAL OFFICES AND PLANT

NEW MATERIALS



USE IT LIKE CONCRETE, work it like wood. You can nail, saw, chop, or drill this new . . .

Lightweight Building Material

A lightweight building material, new to this country, has the properties of stone substances and cement but can be worked like wood. Called Zeprex, it comes fabricated in slabs and blocks.

It holds nails securely, can be cut with a saw or axe, and drilled with a brace and bit. An excellent insulator, it is non-combustible, termite-proof, and almost free of swelling and shrinking, the manufacturer says.

The density of Zeprex varies from 25 to 50 pounds per cubic foot, depending on how it's used. The most common density is one-fifth that of concrete. Standard size slabs are 20 inches wide, 18 feet long, and up to 10 inches in thickness. Slabs can be reinforced with steel for heavy duty.

Zeprex has been used successfully for many years in Sweden in industrial and residential construction. It is used for floor, wall, roofing, and insulating slabs, beams, and building blocks.

The components of Zeprex are chemically united and fabricated in a highly mechanical process under controlled conditions to insure uniformity. The basic component is monocalcium silicate. This is mixed with water, cement, and certain chemicals.

U. S. Plywood Corp., 55 W. 44th St., New York 36.

Turn the page

Every one of these drums can save you money!

These drums contain UNOBA! It's the *original* multi-purpose grease. Purchasing agents for leading manufacturing firms depend on UNOBA. They know from experience that UNOBA grease assures minimum operating costs and dependable protection for machines and equipment.

Because of its versatility, UNOBA grease can be used in practically *all* your grease-cup and gun fittings. In some factories, this one grease has replaced as many as seven specialized lubricants. UNOBA protects against rust, prevents excessive wear and prolongs the life of machinery parts.

Multi-purpose UNOBA is a *barium* base grease. This makes UNOBA ideal for many unusual operating conditions because it is able to resist *both* heat and water. UNOBA sticks to metal surfaces at temperatures ranging from below freezing to over 300 degrees F., *regardless of moisture!*

OFFICES: LOS ANGELES: Union Oil Building • NEW YORK: 45 Rockefeller Plaza • CHICAGO: 1612 Bankers Building
CINCINNATI: 2111 Carew Tower Building • NEW ORLEANS: 917 National Bank of Commerce Building

UNION OIL 76 COMPANY OF CALIFORNIA

UNOBA was developed by the makers of T5X—the amazing purple heavy-duty motor oil.

Lick those leaks—with less re-packing!

Quaker

SHEET PACKING

Put a stop to production stoppers! Re-pack with Quaker—the *super-tough* sheet packing that's *long-life engineered!* It defies high pressures and other "tortures" from steam, gas, vapors or acids. It expands where it should, stays pliable, resists vibration—lasts for incredibly long periods. Whatever type of packing your job requires—Quaker has it, ready for low-cost, trouble-free service.

Write for name of nearest distributor

Belting, Hose, Packing and Moulded Rubber of every construction for every need

QUAKER RUBBER CORPORATION
DIVISION OF H. K. PORTER COMPANY, INC.
OF PITTSBURGH

PHILADELPHIA 24, PA.
Branches in Principal Cities

NEW MATERIALS

Begins on page 176

CASTING SEALANT to improve the physical and chemical properties of ferrous and non-ferrous parts is employed in an exclusive process developed by the Polyplastex International Corp., Inc., 441 Madison Ave., New York. Eliminates microporosity and makes the casting resistant to corrosion by nonflammable hydraulic fluids, the maker claims. Also, a good base for many coatings.

CONCRETE DUST BINDER developed especially for use on concrete floors has been marketed by the United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12. Called Transver 266, it binds together the tiny particles of concrete that are the first sign of floor disintegration.

MARCOTHIX RESIN #1, a polyester resin that will not drain off smooth vertical surfaces, is being produced by Marco Chemicals, Inc., 1711 Elizabeth Ave West, Linden, N. J. Can be applied with brush or spray and will hold fast at elevated temperatures.

SILICON VARNISH FOR CLASS H INSULATION that can be cured as rapidly as Class B varnishes has been developed by the Dow Corning Corp., Midland, Mich. Known as Dow Corning 997, this dipping and impregnating material has over 100 times the dielectric life of Class B varnishes at 200 C., the maker says. Cures more rapidly because it shows less tendency to bubble at 300 F.

LURIUM is a lightweight metal that can be highly polished. Composed of 99.99% aluminum and other metals, this alloy will not lose its luster even when submerged in salt water. Developed in Germany, it is being introduced here by Fromson Orban Co., Inc., 205 E. 42nd St., New York 17.

the ring's the thing that

KEEPS DIRT OUT

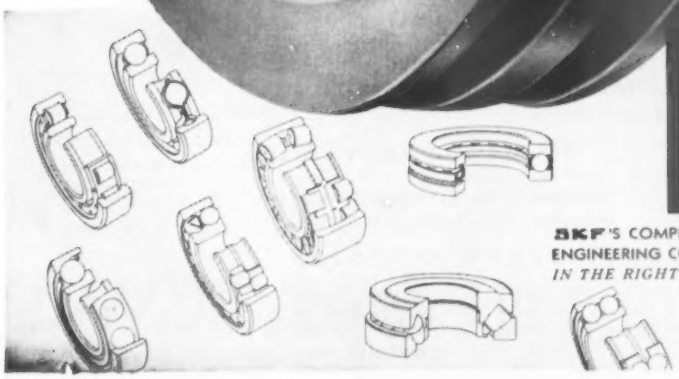
Here's why SKF Triple-Seal "SAF" Pillow Blocks are your solution:

- SKF Triple-Seal "SAF" Pillow Blocks are easy to install and inspect.
- The Triple-Seal rotating rings provide effective sealing from dirt; retains any kind of lubricant.
- The bearings are self-aligning.
- Available with ball bearings or spherical roller bearings, free or held . . . for either adapter mounting or direct mounting of bearing on shaft.

When you have a bearing replacement to make, call your SKF Distributor. He'll show you *why* you will minimize bearing trouble with SKF Triple-Seal "SAF" Pillow Blocks. Remember—your SKF Distributor is a bearing *specialist*.

7384-A

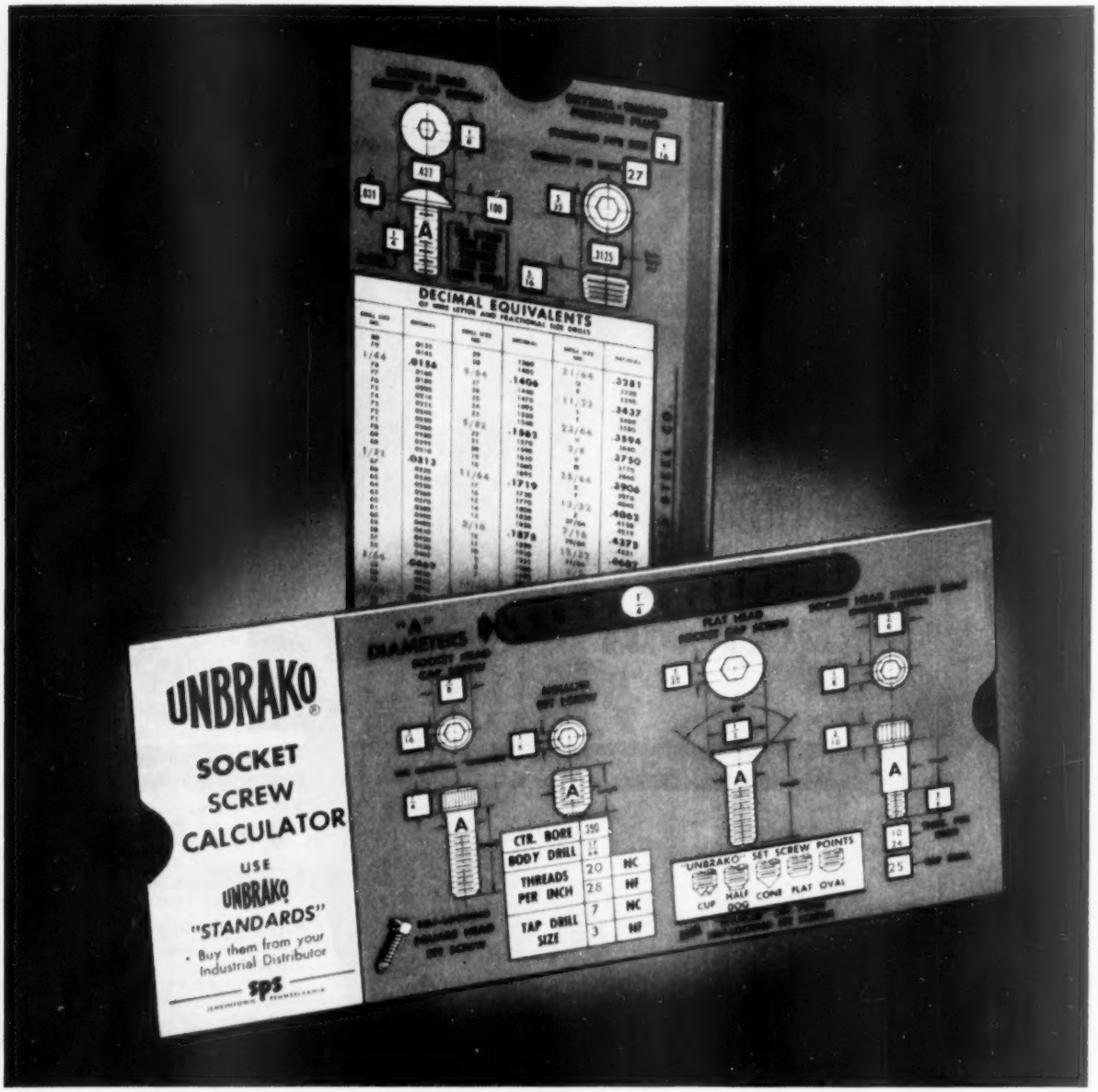
SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.,— *manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*



SKF®

BALL AND ROLLER BEARINGS

SKF'S COMPLETE LINE OF ANTI-FRICTION BEARINGS, PLUS **SKF** ENGINEERING CO-OPERATION, HELPS YOU PUT *THE RIGHT BEARING IN THE RIGHT PLACE*



Our New UNBRAKO Socket Screw Calculator—YOURS FOR THE ASKING

This handy pocket-sized slide-rule type socket screw calculator gives diameters, lengths, socket dimensions, threads and drill sizes—in fact, everything you want to know when using UNBRAKO socket screw products. And it's free.

Ask your UNBRAKO distributor, or write to SPS, Jenkintown 11, Pa.

UNBRAKO®

Standard UNBRAKOS *sold by leading industrial distributors everywhere.*

SOCKET SCREW DIVISION

Our Fiftieth Year : A START FOR THE FUTURE

SPS
JENKINTOWN PENNSYLVANIA

Self-Locking Set Screws • Flat Head Cap Screws • Shoulder Screws • Knurled Head Cap Screws • Dowel Pins • Button Head Socket Screws

LINDBERG HYDRAULIC CYLINDERS

... now available for pressures to 3000 PSI

For extra power applications, it'll pay you to investigate the new Lindberg line of hydraulic cylinders for operation up to 3000 PSI ... ruggedly and heavily designed for extra performance. Added to the 1500 PSI hydraulic cylinders, this line gives you a selection from 0 to 3000 PSI ... and supplements the Lindberg line of air cylinders.

Check these Lindberg features for dependable, low cost power for lifting, forcing, pulling, pressing, pushing and clamping:

ROTATING CAPS ... Caps can be easily rotated in order to position ports for piping. Just remove cap screws, and revolve head cap ... it isn't necessary to disassemble cylinder. This feature permits simplified piping, and frequently eliminates need for T-fittings or elbows.

NO TIE-RODS ... Welded flange construction eliminates need for tie-rods ... insures proper alignment.

PACKING RESISTS OIL AND TEMPERATURE ... Chevron type piston rod packing is made of special asbestos cloth and rubber compound ... resists high temperature ... is not affected by oil.

NEOPRENE O-RINGS ... Conventional gaskets are replaced by Neoprene O-rings. Sealing action is automatic ... the higher the pressure, the tighter the seal.

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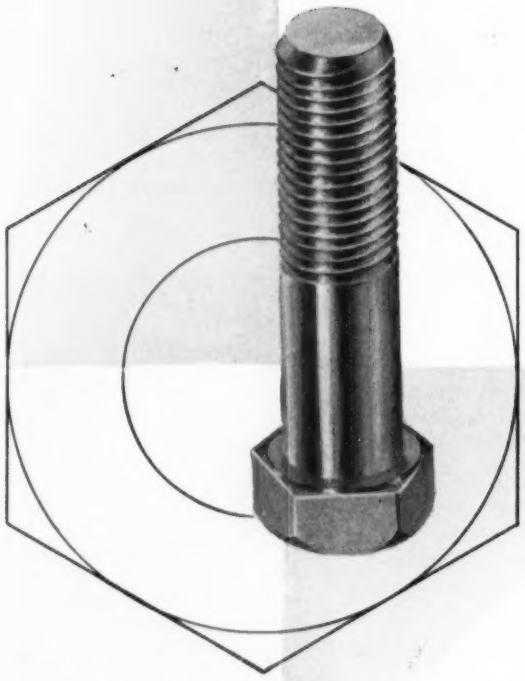

ANTI-CORROSIVE METAL PRODUCTS CO., INC.
Castleton-on-Hudson
New York

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BOOKS

For All Executives

HOW TO GET AHEAD IN MODERN BUSINESS

By Harry Simmons. Prentice-Hall Inc., 70 Fifth Ave., New York. 323 pp. $3.95.

As long as you're not too old to learn, this book may be of some help to you. With 28 chapters and 300 plus pages, this is a long book, as "self-improvement" books go. Covers just about everything that might contribute to a successful business career — from creative thinking to emotional stability to writing and speech making.

The last chapter is what the author calls "a magic formula for self-improvement." In it he develops the "six S's" which he considers all-important for attaining success:

- Stimulate the interest of others in yourself
- Sizzle with snap and enthusiasm
- Serve the interests of others as well as your own
- Solve company problems as you move forward
- Sell not only your ideas but also yourself
- Samples of your work should be exhibited

Personal success stories by over 100 top executives, educators, and public figures back up Mr. Simmons' theories.

In addition to the "six S formula," the author advises that a serious, continual self-improvement program be undertaken. This program should include study in your specific field of endeavor plus reading to increase your general business knowledge. He stresses organization of time as the most important factor in self-improvement.

Turn the page

Give Your Ejection Problems the Air

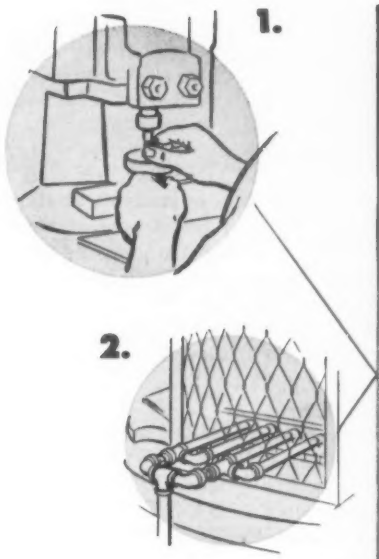
...and boost production and safety

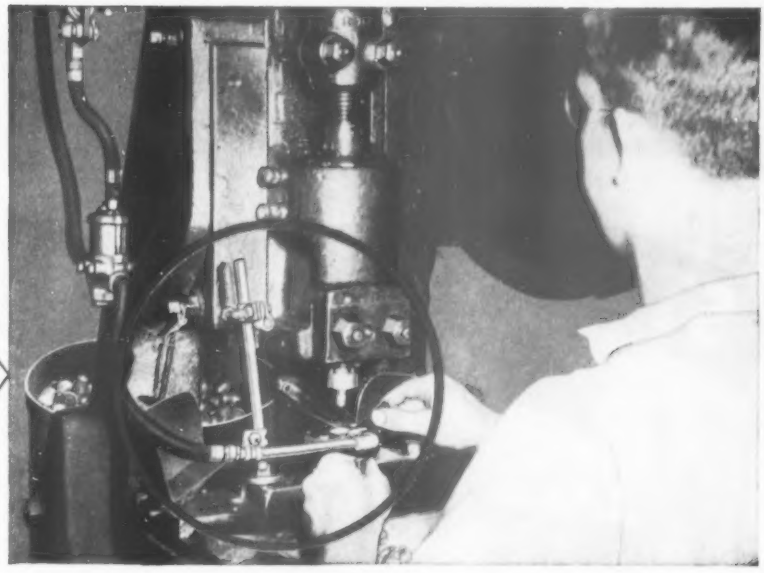
1 End slow, dangerous hand removal of work with a Schrader Air Ejection Set. Install Schrader Air Ejection Sets on your power presses—or any machines with moving parts to actuate a cam or sliding tripper. You'll find production soars—up to 100% . . . operator safety is boosted 50%. Replace hand removal with Schrader Air Ejection and watch your presses take a new lease on life.

2 Replace wasteful, homemade steady air blasts with Schrader Air Ejection Sets. Air costs drop as much as 90% because Schrader Air Ejection Sets ration out *just enough* air to do the job . . . synchronize your air blast with demand. Before you decide your old compressors have reached full capacity, check with Schrader to see how to cut air waste.

Schrader Air Ejection Sets are delivered fully assembled and ready to go to work. Their low cost is more than repaid in just a few weeks.

See how Schrader Air Ejection Sets will help you plan more effective use of machines. Write, describing the machines on which their use is contemplated—or fill out the coupon below.





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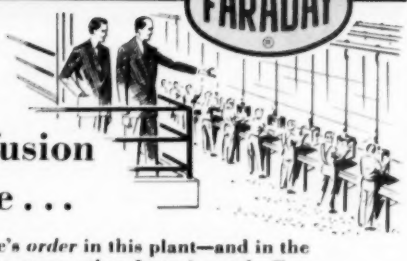

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There's *order* in this plant—and in the many, many other factories and offices equipped with Faraday signals and systems. They stop confusion and save steps, paging and signaling clearly and faithfully, day-after-day, year-after-year.

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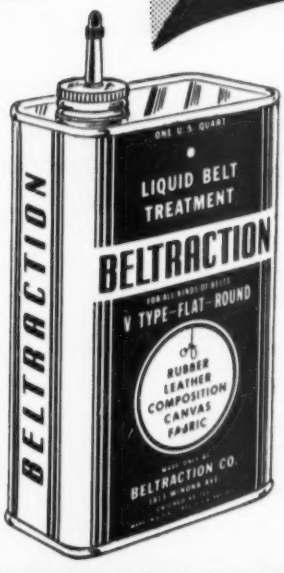

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BOOKS

Begins on page 182

Book Briefs

MATERIALS HANDLING

Basically a textbook for college students. Will also interest industry people who want a basic knowledge of materials handling. Covers principles, equipment, packaging, and shipping. By John R. Immer, McGraw-Hill Book Co., 330 W. 42nd St., New York. 591 pp. $8.

HUMAN CONDITIONING IN THE FACTORY

A useful review of fundamentals on most factors that affect basic working conditions in a plant. Discusses such problems as control of noise, color and lighting, nutrition, clothing, temperature, and humidity. Prepared by a group of students at Harvard Graduate School of Business Administration. Includes charts and diagrams. A few copies of the report are available. Write Jack H. Doty, 54 Fairview Ave., Belmont, Mass. 95 pp. $5.

ATMOSPHERIC POLLUTION

Here is a timely book covering the problems of atmospheric pollution. Takes up the causes, properties, remedies, and makes recommendations for future action. By A. R. Meetham. Pergamon Press Ltd., London, England. 268 pp. $4.90.

SELECTED CASE PROBLEMS IN INDUSTRIAL MANAGEMENT

A stimulating line-up of case studies that can be used for executive development training programs or in college courses. By Paul E. Holden and Frank K. Shallenberger. Prentice-Hall, 70 Fifth Ave., New York. 318 pp. $3.75.

Turn the page

FASTEST THING IN FASTENINGS®

Speed Nut

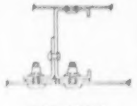
CONVAIR saves 448 man hours per plane... on one SPEED NUT fastening operation!

Tremendous savings like these by Consolidated Vultee Aircraft Corporation's San Diego Division may be hard to imagine, but...they can be made! Convair Engineering and Production experts are making this amazing economy on *one* SPEED NUT fastening operation... the installation of cargo liners in the new Convair 340 passenger transport! Also, the same operation yielded a sensational 80% reduction in production time, plus a 40% cut in materials and handling. Completing the story... the use of this U-Type SPEED NUT has eliminated an entire assembly section, releasing several trained aircraft workers to other production jobs!

Considered in terms of industry-wide aircraft production... savings and production boosts like these can mean millions of dollars. For similar solutions to fastening problems you may have, see the Tinnerman representative in your area!

U-TYPE SPEED NUTS

SPEED NUT WAY: A U-Type SPEED NUT and a No. 10 sheet metal screw are all it takes per hole application.



OLD WAY: Required: 2 each, Plate Nuts, Screws, Washers; 4 rivets; 1 angle trim; 1 doubler strip, per hole application.

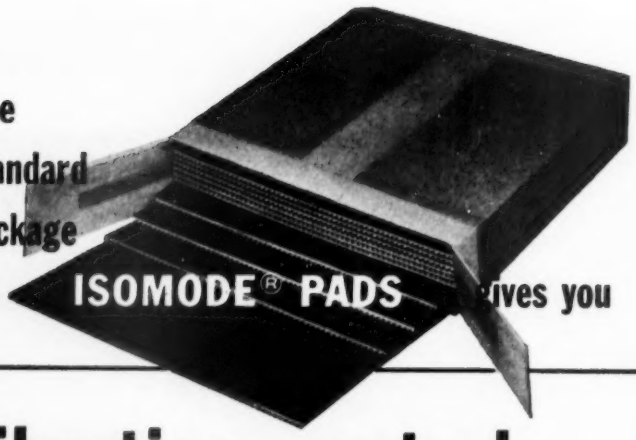
Comparing the above methods it's easy to see how the 450 hole applications required per airplane amount to tremendous savings.

Send today for your copy of SPEED NUT "Savings Stories"; write: TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine).

TINNERMAN Speed Nuts®

MORE THAN 8000 SHAPES AND SIZES

One standard package of ISOMODE® PADS gives you



vibration control for 80 tons of machines

. . . INCLUDING PRESSES

It pays to keep at least one standard package of ten Isomode Pads in stock at all times. Costs less that way, and then you always have it on the spot for installing machinery – up to 80 tons of it. With that much equipment mounted on Isomode Pads, you'll *really* see a difference in plant operations. Here's why:

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3. Vibration control enables you to locate machines for maximum production efficiency without disturbing offices or adjacent equipment. Improves quality of the work.
4. Flexibly mounted equipment means less damaging effect on building, less strain on machines. This cuts maintenance, saves money.

Isomode Pads support up to 50 lbs/sq. in. At these loads, they *efficiently* isolate machines from floor – absorbing both shock and vibration. Simply cut to size to fit under feet. Thousands of installations show these DuPont Neoprene pads last for years. Send in coupon.

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Please send bulletin No. 415 containing more information on Isomode Pads and how to install them easily and quickly.

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BOOKLETS

Begins on page 182

QUALITY-CONTROLLED PAPERWORK AND RECORD KEEPING. National Records Management Council, 337 W. 27th St., New York 1. Bring quality control into the office. This booklet gives case studies, then explains how you can get better operating efficiency in your clerical operations for less cost. 32 pp. $2.

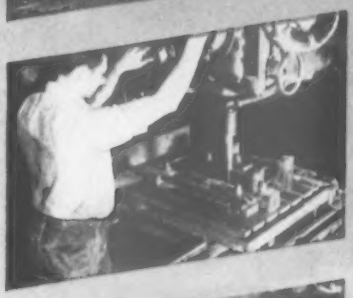
CARE AND MAINTENANCE OF GRINDING WHEELS. Technical Aids for Small Business, Small Defense Plants Administration, Washington 25, D. C. This will supplement FACTORY's April article "Ten Steps to Grinding Wheel Safety" (p. 104). Should be of interest to all safety men in your company. 4 pp. Free.

UNEMPLOYMENT COMPENSATION IN A FREE ECONOMY. National Assn. Manufacturers, 14 W. 49th St., New York 20. A detailed analysis and reexamination of the problem of the unemployment compensation by a management group. Offers a different slant from most of the government - sponsored literature published on this important subject. 38 pp. Free.

PREVENTATIVE MANAGEMENT. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Prescribes a formula for bettering personnel relationships by keeping trouble from developing. 20 pp. Free.

MEDICAL SERVICES FOR INDUSTRIAL PLANTS. Director of Civil Defense, Nashville, Tenn. This booklet should be of interest to your medical and safety people. Covers plans, organization, supplies, and training for better coordination in case of emergency. 18 pp. Free.

BULLARD SPACER



We can offer FAVORABLE DELIVERIES on BULLARD SPACERS

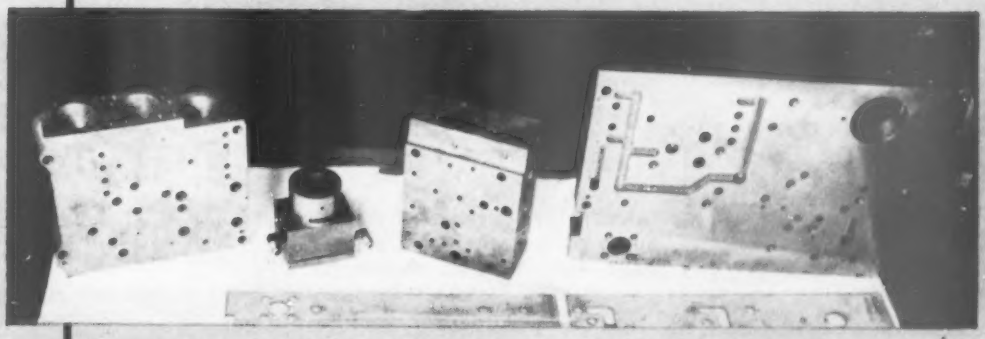
Norton Company, Grinding Machine Division

is obtaining important advantages from use of 4 BULLARD SPACERS on intricate drilling, reaming and tapping jobs.

Among the benefits received is a marked reduction in Operator fatigue. This is especially pronounced in overtime operation.

NORTON COMPANY has also found that with incentive time allowances, jig work Operators' efficiency is regularly held at 90% to 125%, while that of their Operators on BULLARD SPACERS runs 115% to 150%.

Ask for your copy of "The Norton Story"



THE BULLARD COMPANY

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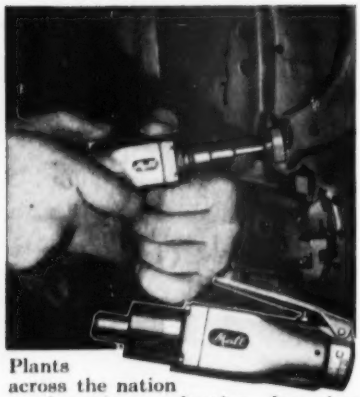
NEW featherweight PRODUCTION CHAMPS

Mall

PRECISION AIR TOOLS



Plants across the nation are boosting production—lowering costs—reducing worker fatigue with MALL Pneumatic Tools. The reason: abundant, vibrationless power; streamlined featherweight design; top-quality construction. Above is the new MALL PG-K-1030L Die Grinder weighing only 12 ounces. Guaranteed speed 30,000 rpm. with less than .0015 collet runout for extreme accuracy—a typical example of the precision engineering in MALL Air Tools.

Drills Grinders Polishers Screwdrivers

40 Factory-Owned Service Warehouses, Coast to Coast, to Service Our Customers Quickly and Capably.

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MU-8

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"THE VITAL LINK" is a 20-min. sound-slidefilm on how to select economical unit substation sizes, what circuit arrangements fit specific needs, how to select and maintain proper voltages, and what protective devices should be built in. Color. Write:

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Continuous-Cast Products Dept., American Smelting & Refining Co., Barber, N. J.

"CONTACT" illustrates the many factors you have to consider in selecting the best connector for your job. Covers a wide range of subjects, such as voltage requirements and mounting devices. 30 minutes, color. Write:

Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York 20.

"A BETTER WAY TO PRODUCE CARTRIDGE CASES" shows you how a new type double-end horizontal press works. (FACTORY, April 1953, p. 280.) You watch the press operations in making a 24-in. shell case. 25 minutes. Write:

Advertising Dept., Clearing Machine Corp., 6499 W. 65th St., Chicago 38.

"ANNOTATED BIBLIOGRAPHY OF AUDIO-VISUAL AIDS FOR MANAGEMENT DEVELOPMENT PROGRAMS" is a 10-page booklet listing descriptions and sources for 109 films you can use in plant training programs. Costs $2.50 from:

Charles A. Hebert, Research Service, 353 W. 57th St., New York 19.

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PANGBORN BLAST CLEANING GIVES YOU FASTER, CHEAPER MAINTENANCE

Either a Portable Unit to Clean Structures...

Pangborn Blast Cleaning Machine—Cleans tanks, bridges, buildings, and other structures quickly and economically. Ideal for maintenance and other jobs, such as removal of dirt, scale, rust, etc. preparatory to painting. Six sizes, stationary or portable, from . . . $187 and up.

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Pangborn Blast Cabinet—Saves time and money in cleaning small metal parts . . . removing rust, scale, grime, old paint, etc. Produces smooth, clean surfaces on pieces up to 60" x 35" in size. Models from . . . $319 and up.

Pangborn Unit Dust Collectors—Trap dust at the source. Minimize maintenance, allow reclamation of valuable material . . . $286 and up.

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Write for details on these machines to: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

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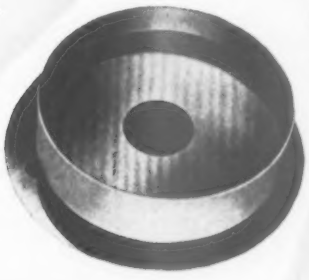
BLAST CLEANS CHEAPER

Tiny?

Yes! The No. 11 Blanchard Surface Grinder grinds these ladies' watch gears, pinions and ruby bearings flat and parallel, and to a dimension tolerance of .0002".

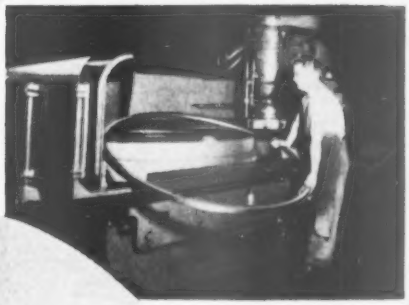
Smooth?

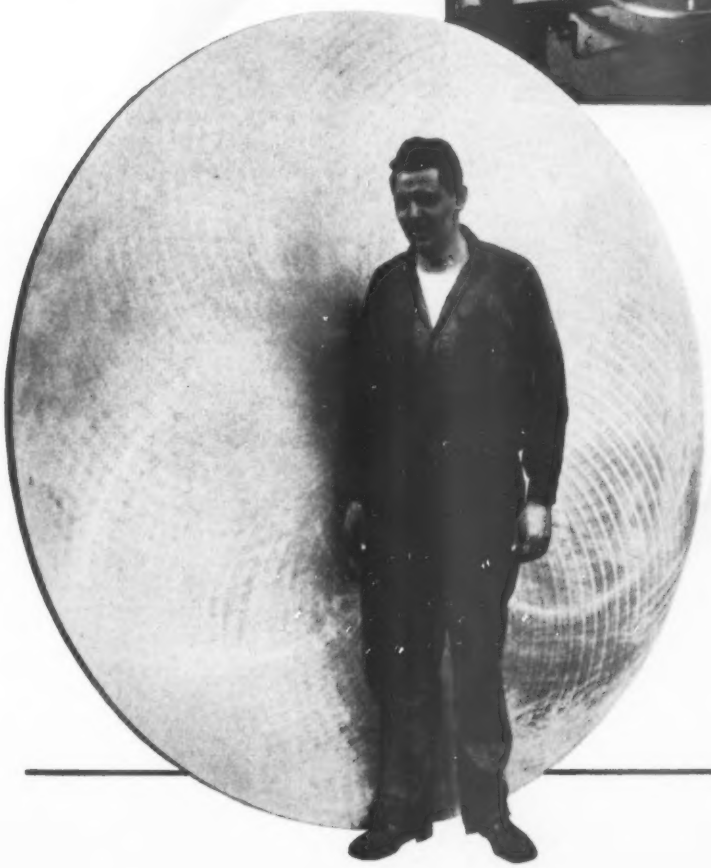
Of course! The Blanchard No. 11 finished this refrigerator plate, seen through an optical flat, to 3 micro inches and flat within 1 light band (.0000118").



Accurate?

Sure . . . and easy, too! This Blanchard grinds 84" forged steel rings flat within .0002", parallel to .0002", dimension tolerance of ±.0005", and with surface finish of 4 micro inches.





Tremendous?

Yes . . . but fast! This 88" diameter cast-iron plate was ground on a No. 42-72-84 Blanchard in 3½ hrs., floor to floor. ¼" of stock—1520 cu. in.—380 lbs. was removed.

If you produce flat surfaces, your best bet is Blanchard Grinders—with Blanchard Wheels!

PUT IT ON THE BLANCHARD

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

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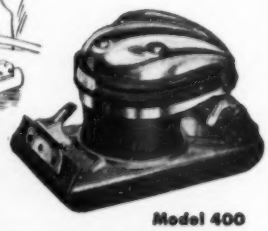
Sanding Problems?

Model 300

NATIONAL SANDERS

can speed production in your finishing room

National Models 300 and 300A are straight line action, reciprocating, two-pad, air sanders. Felt, rubber, and neoprene pads in different sizes and shapes are available for various types of surfaces and materials. Water attachment is built in for wet sanding.



Model 400

National Models 100 and 400 are orbital action, single pad, air sanders. Orbital action provides faster cutting and longer abrasive life. These lightweight, vibrationless, fast sanders can cut finishing time as much as 75% over hand sanding. See your dealer, or write for details.

NATIONAL NS SANDERS

NATIONAL AIR SANDER, INC.

2816 AUBURN STREET, ROCKFORD, ILLINOIS

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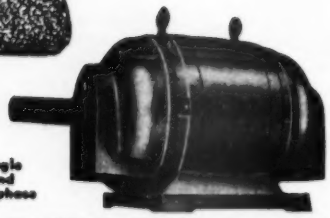
NOT CUSTOM PRICED



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Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

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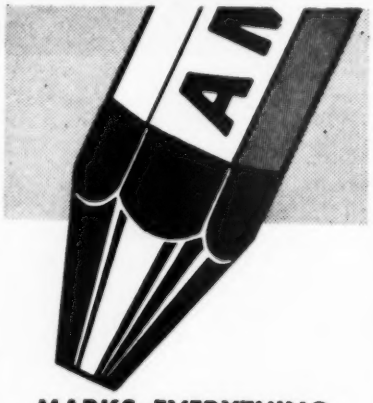

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Begins on page 188

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American Felt Co., Glenville, Conn.

"RESIN AND WOOD — PERMANENT PARTNERS" traces the making of plywood from the fall of the tree to the finished product. Describes adhesives used. 20 minutes, color. Write:

Reichhold Chemicals, Inc., 630 Fifth Ave., New York.

"WELDING, MOTION PICTURES, TECHNIQUES AND APPLICATION" is a bibliography that lists 87 of the "best films" on welding techniques and applications. Includes complete descriptions and source information on free films. Costs 75¢. You can make your check or money order payable to Treasurer of the United States, and mail together with your request to:

Dept. of Commerce, Office of Technical Services, Washington 25, D.C.

"LIGHTNING MASTERS" shows the effects of lightning on power systems and equipment and tells how to protect against damage with lightning arrestors. Especially designed for showing to electric utilities, but of some interest to industrial people. 30 minutes, color. Write:

General Electric Co., 1 River Road, Schenectady 5, N. Y.

FILM BULLETINS published regularly by the National Assn. of Manufacturers are always worth checking when you're considering setting up a film program in your plant. You'll want to keep them for reference, too. Just ask to get on the bulletin mailing list. Write:

Motion Picture Dept., National Assn. of Manufacturers, 14 W. 49th St., New York 20.

Workers Sing in the Showers

Regulated by POWERS

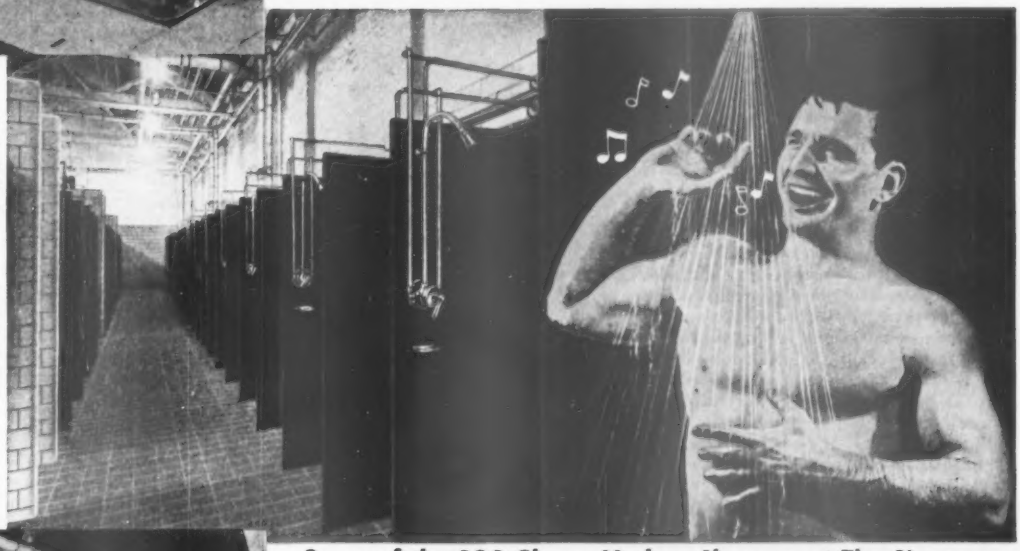
at The SINGER MANUFACTURING CO.

Plant in Elizabethport, New Jersey

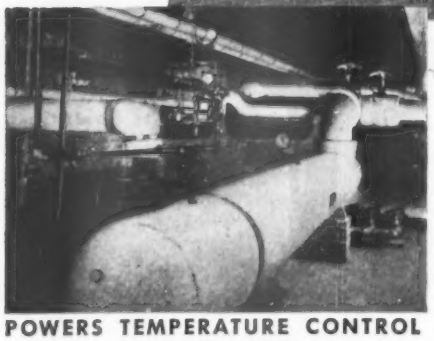
Above:
A magnificient new model in the already world-famous line of SINGER Sewing Machines

•

Right:
One of Singer's Shower rooms has 98 showers, another 58 and there are several smaller ones for individual groups.



Some of the 190 Clean, Modern Showers at The Singer Mfg. Co. Each shower is individually controlled by a



POWERS TEMPERATURE CONTROL on HOT WATER GENERATORS

serving the various shower rooms is shown above. For this type of service a Powers ACCRITEM Regulator and FLOWRITE Valve are often used.

When You Have Problems of Water Temperature Control contact Powers nearest office. With over 60 years experience and a most complete line of controls we are well qualified to help you.

Mixer for Exposed Piping

POWERS

Thermostatic WATER MIXER

The Best Showers that money can buy — is only one of the many reasons why employees remain almost twice as long with SINGER as the national average.

Mr. F. H. Gummick, Plant Engineer for this famous 100 year old firm, says "The Singer Mfg. Co. has provided employees with the best shower room equipment obtainable. We consider it an investment in good employee relations."

Powers Temperature regulators on each individual shower as well as on the hot water generators serving the showers is the best insurance for a SAFE, COMFORTABLE shower.

No Unexpected "Shots" of icy cold or scalding water here. Powers *thermostatic* water mixers always keep the water temperature just right — regardless of **pressure** or **temperature** changes in water supply lines. Write for catalog Rb24.

(b14) • *Only ONE Shower Accident Can Cost Many Times More Than POWERS Water Mixers* •

Established in 1891 • THE POWERS REGULATOR COMPANY • SKOKIE, ILL. • Offices in Over 50 Cities

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"AUTOMATION" IS ALREADY AN ACCOMPLISHED FACT in dimensional inspection. Federal Automatic Gages perform, at high speed and without human error, the same functions as human inspectors. A Federal Automatic Gage checks the linear measurements of the workpiece, rejects it if outsized, or sorts it into one of several dimensional categories for Assembly. Install it directly in your production line if you wish. It gages, sorts and distributes parts at speeds which until recently were fantastic and to limits in the order of 25 millionths of an inch or better. One such gage sorts parts into six different size classifications of .0001" at the rate of 400 per minute. Any or all gaging systems can be used — electronic, electric, or air.

We have helped many plants solve their gaging problems and we can help you, too. The coupon below will bring us together. Federal Products Corporation, Prov. 1, R. I.

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BEHIND THE BYLINE

Meet some of the men in industry who wrote articles for this issue of FACTORY.

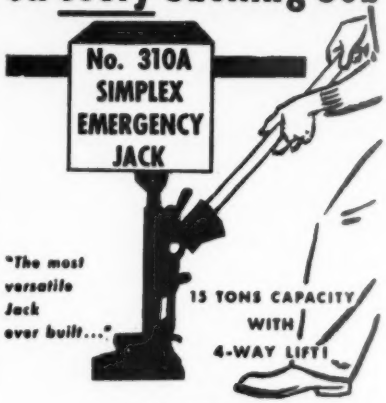
H. THOMAS HALLOWELL, JR. (page 52) began work for Standard Pressed Steel Co. as a machine operator more than 25 years ago, became president in 1951. He has applied capital investment as a continuing policy to boost output and wages, keep prices down.

ARNO H. JOHNSON (page 58) is the author of several articles on economics and marketing. Today he's vice president and director of media and research for J. Walter Thompson Co., advertising agency.

WAYLAND P. SMITH (page 70) who writes about work sampling at Lincoln Electric Co., teaches industrial engineering at Case Institute of Technology. He's had previous experience as a time study engineer and production manager.

Turn the page

SAVE-with Safety use a SIMPLEX on every Jacking Job



● Save time and money on every job with this easy-to-use, Simplex Emergency Jack that is engineered for safety. Jack tilts on base for angular operation. Lifts full capacity on cap; on auxiliary cap shoe; on the machine serrated toe, or at any intermediate point by using chain as sling!

● RATCHET LOWERING JACKS

A Complete Line for Every Jacking Job

Safe! Fast! Powerful!

1½ to 35 Tons Capacity

For all general duty lifting, lowering, moving, leveling, skidding.

● SCREW JACKS

88% Easier Lifting!

4-Way or Ratchet Head Types

31 Models — 10 to 24 Tons Capacity

Single ball nested under cap won't flatten; cap can't slip. Friction reduced 88%. Malleable housings.

● HYDRAULIC JACKS

Leakproof Neoprene Seals

8 Models — 3 to 100 Tons Capacity

Tested to 50% Overload

For shops, factories, construction, transportation and mine jacking.

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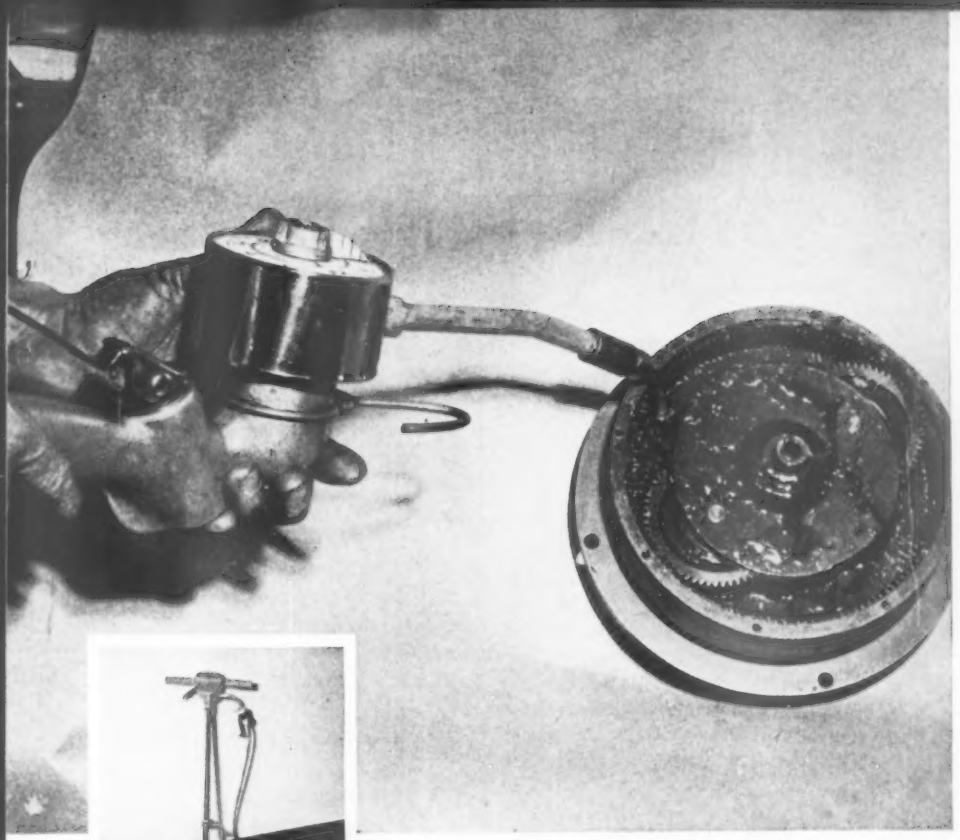

Solves leakage problem . . .

● Multi-clean Products, Inc., St. Paul, Minnesota, manufactures industrial floor polishing and scrubbing machines. The machines are shipped with grease already installed in gear reduction units. The problem faced by this company was one of finding a grease that would stand up under hard service and not leak from the gear units. Greases tried either caused or threatened leakage troubles.

Called in on this problem, a Standard Oil lubrication specialist recommended STANOBAR Grease "S", a highly stable grease with a unique adhesive characteristic. Given an accelerated service test, STANOBAR did not leak from the gear unit, and its consistency showed no change that would later cause a leakage problem. There was no wear of gears or bearings. Adopted for use in the units, STANOBAR has solved this company's lubrication problem on every count. Officials have been able to eliminate the costly and troublesome practice of having all units returned to the factory, at 12 months intervals, to be repacked with grease.

STANOBAR
TRADE MARK
Grease

The same lubricating qualities of STANOBAR that solved this problem for Multi-clean Products, Inc. can serve you in a wide variety of applications. A Standard Oil lubrication specialist will be glad to discuss those applications with you. He's right there in your section of the Midwest. You need only phone your local Standard Oil office. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

C. L. Daub of Standard Oil's Minneapolis office is the lubrication specialist who helped Multi-clean Products, Inc. solve an important lubrication problem through his recommendation of STANOBAR Grease.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job assistance is always available to the industries in the immediate area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest. Call for the services of your Standard Oil lubrication specialist today. When he stops at your plant, be sure to get information on these outstanding products:

STANOIL Industrial Oils—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One of two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specially developed for its intended use. The grades range from a fingerprint remover to a heavy semi-solid that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY STANDARD *(Indiana)*

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BEHIND THE BYLINE

Begins on page 192

W. J. NIEDERAUER (page 67) has been with Otis Elevator for 16 years. During 5½ years in the army, he served as chief of the industrial safety activities for the ordnance department. Now he's safety director at Otis. He lent a guiding hand to the program described.

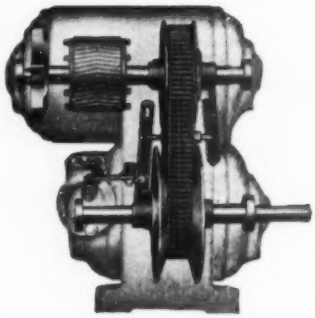
D. A. PETRYZYN puts injury records to work (page 67). As safety engineer at Otis' Harrison, N. J., Works, he gets plenty of opportunity to use his college background in engineering and industrial psychology.

WENDELL M. PATTON (page 74) tells you how to find out what your foremen want to know. He's a senior associate with Bruce Payne & Associates, Inc., management consultants. His special fields include labor relations, executive development, and attitude analysis.

A Cork Closure Mfr. Increases Production 20%

Mr. R. Vincent Torras, Vice-President of Consolidated Cork Corporation, states, "Through years of experience we have found that variable speed drive as provided by Sterling Speed-Trol has increased our production by 20 per cent. Speed-Trol has also given us the much needed control of quality of the finished product."

STERLING SPEED-TROL



OUTSTANDING FEATURES:

Infinite speeds—positive speed regulation—fingertip control—large indicator—positive pulleys—no springs—belt tension in proportion to load—protected—streamlined—Herringbone Rotor—through ventilation—versatile mounting—NEMA dimensions—shock absorbing—quiet operation—rugged—compact—dependable—long life.

20-page illustrated catalog... Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. 1B-418.

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ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile
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—Mr. G. J. Werner, Traffic Manager, Motorola, Inc., on screen of new Model 21T4.

"Our program never goes off the air!"

"Tens of thousands of component parts . . . thousands of suppliers all over the country . . . a daily 'hot sheet' of critical items needed within 24 hours or less . . . that's just a glimpse of our traffic picture at Motorola!

"Yet our production lines never stop for lack of available parts – because our production program never goes 'off the air.' We use Air Express! With our tremendous, and steadily growing overall shipping volume, there is daily need for this top-speed, *reliable* service.

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"Day in, day out, Air Express is an integral and important cog in Motorola's overall operation."

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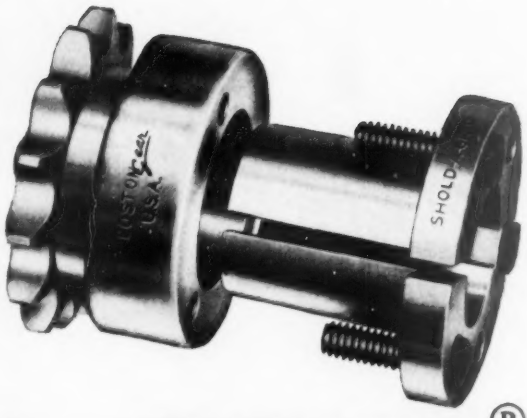
Correct Taper FOR EASY REMOVAL



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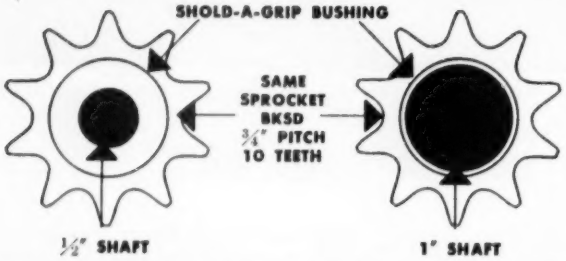
INTERCHANGEABLE TAPERED BUSHINGS AND SPROCKETS

BROADER SIZE RANGE. FIT SHAFTS ½" to 2½" by 16ths

Any commonly used sprocket, ½" to 2¼" pitch, can be interchanged on an extended range of shaft sizes. SHOLD-A-GRIP's high-strength design restricts screw holes to sprocket shoulder. Thus, many smaller sprocket sizes are added to the interchangeable class.

ONE SPROCKET FITS MANY SHAFT SIZES SIMPLY BY CHANGING THE BUSHING



Example: Sprocket BKSD, ¾" pitch, 10 teeth, can be used on 9 different shaft sizes, any size from ½" to 1" by 16THS, by inserting the correct size SHOLD-A-GRIP Bushing.

Illustration at top of page is typical design of SHOLD-A-GRIP Bushing and Sprocket with minimum number of teeth.

Illustration at right is typical of design of SHOLD-A-GRIP Bushing and Sprocket with maximum number of teeth.

Correct Taper FOR SLIP-PROOF GRIP

Boston Gear expert engineering has provided a correct taper in SHOLD-A-GRIP Bushings and Sprockets for slip-proof grip. When screws are tightened the bushing grips both sprocket and shaft with maximum holding power, even on shafts which vary from true diameter.

Correct Taper FOR EASY DISASSEMBLY

Correct taper saves time and trouble in removal. Cap screws are removed, then two screws are driven in the two threaded holes in bushing flange. Tightening screws releases bushing—quickly, easily.

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View of part of group of 18 cam milling machines equipped with Lincoln Centralized Lubrication System
TIME CLOCK
PUMP
INJECTORS

Motor Car Manufacturer Breaks Production Bottleneck with *Lincoln* CENTRALIZED LUBRICANT APPLICATION SYSTEMS

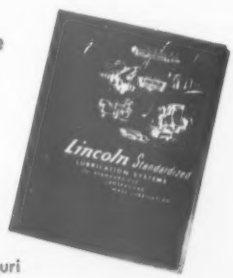
- Slashed Rejects by 80%
- Increased Production Materially
- Eliminated Down-time Due to Bearing Failure
- Eliminated Down-time for Lubrication
- 50% Reduction in Quantity of Lubricants Used
- Reduced Machine Noise, Increased Operator Efficiency

One of the country's largest Motor Car manufacturers wanted to increase production in its cam milling department to gain a competitive advantage—but found that the time required for delivery and installation of additional machines made that solution impractical. The problem was solved—and the cost of new machines was saved by installing a Lincoln Centralized Lubrication System on the existing battery of 18 Cam Milling Machines.

The automatic time clock controlled system increased production by eliminating down-time due to bearing failures and by eliminating 80% of rejects. This installation has been so successful that they have since equipped 15 crank pin lathes and 11 crankshaft cheekers with Lincoln Centralized Systems—and are planning to equip other departments.

Real savings like these are being made throughout industry by discarding old-fashioned oil cans and grease guns and replacing them with modern Lincoln Systems that CONTROL lubricant application. Applying the *right* lubricant, in the *right* quantity, at the *right* time with a Lincoln Centralized System can bring these advantages to production machinery in your plant.

To find out more, write for your FREE copy of Catalog 80



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LINCOLN ENGINEERING COMPANY, 5731 Natural Bridge Ave., St. Louis 20, Missouri

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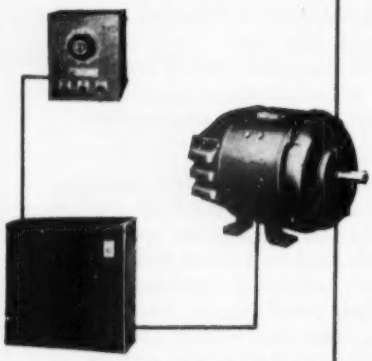

Conveniently packaged, factory-wired V★S Drives are available from ¼ to 300 hp. Two or more motors may be operated simultaneously from a single Control Unit.

CONVENIENT CENTRALIZED CONTROL—V★S Drive makes speed changing so easy and convenient that the most economical speed for every operation can always be used. Convenient-to-operate controls are grouped and located where your operator can easily, quickly and safely control all functions of his machine. Controls may be at the machine, or at any remote location, as desired.

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CONTROLLED ACCELERATION AND DECELERATION—V★S Drive provides positive all-electric control of torque for breakaway and for acceleration or deceleration. Speed changes may be rapid or gradual, and as frequent as desired. Shockless speed changing with V★S Drive avoids damage to delicate materials or fabrics.

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INCHING, JOGGING, CREEPING—V★S Drive provides inching, jogging, and creeping, for setting up, threading, positioning, or inspection. Operator can slow down a machine for inspection, then accelerate quickly and *exactly* to previous working speed.

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D-1455

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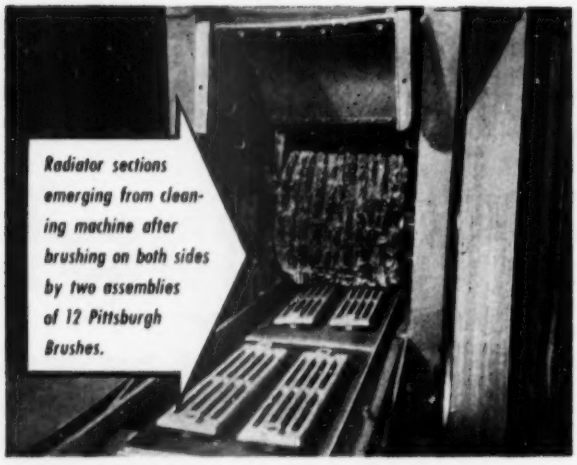

Radiator sections emerging from cleaning machine after brushing on both sides by two assemblies of 12 Pittsburgh Brushes.

Pittsburgh Brushes can help you solve problems like these!

Cleaning Narrow Spaces—National Radiator Company, Johnstown, Pa., cleans 30,000 radiator sections a week! To insure a perfect final finish, even the narrowest spaces must be absolutely clean prior to assembly. Pittsburgh engineers were asked to design a brush that would reach these spaces and would fit National's existing machine. Successful? National reports: "Pittsburgh Brushes do a better job of cleaning and are more economical."

Preparing Chills—At Continental Foundry & Machine Co., East Chicago, Indiana, chills used to cast iron rolls must be cleaned of the oxidized metal remaining from previous usage, as well as dirt and grease accumulated in storage. After experimenting with other brushes, Continental chose Pittsburgh because they "do the job better and stand up longer than any previously used."

Improving Original Equipment—The Sommer and Maca Glass Machinery Co., Chicago, Illinois, uses Pittsburgh Brushes in the automatic washing machines they manufacture. Brushes formerly used simply didn't have the over-all density pattern needed. Pittsburgh engineers studied the problem and designed a brush which Sommer and Maca approved "because of (its) denser bristle pattern and lower cost."

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Write today for a free copy of our booklet that shows, through actual case histories, how Pittsburgh cuts brushing costs. Address: PITTSBURGH PLATE GLASS COMPANY, *Brush Div.*, Dept. W-3, 3221 Frederick Ave., Baltimore 29, Maryland.

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Big savings in *cost of training new employees* (as high as 75%); reduction in *accidents* and *spoilage;* labor *turnover* reduced 30% or more.

Also increased earnings of employees, less absenteeism, and other gains.

Briefly summarized in a Booklet — which we'll be glad to send to any personnel official on request.

Keystone View Co., Meadville, Penna. Pioneers in Binocular Vision Testing.

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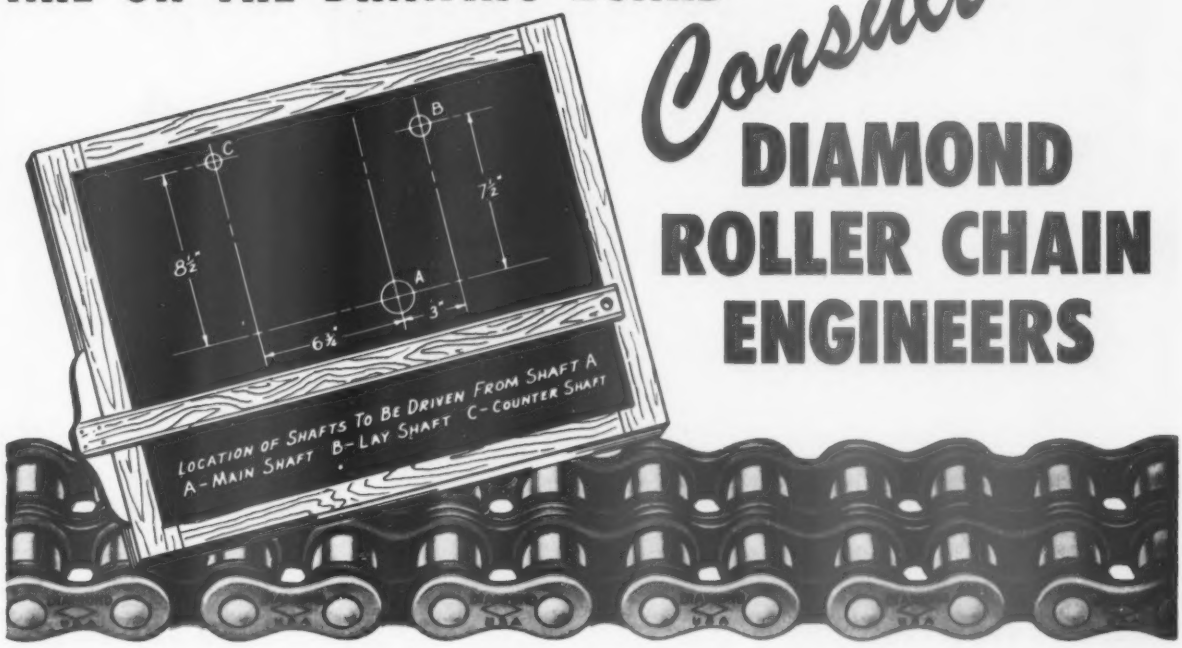

Because of the wide adaptability of Diamond Roller Chains — their use may help you provide these worthwhile features: —

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- ✓ Reduced overall weight
- ✓ Reduced cost
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- ✓ Added reliability
- ✓ Ease of assembly and maintenance

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Maximum rigidity of links insured by special pitch hole preparation for 100% effective bearing area of pin and bushing. Longer life, smoother operation.
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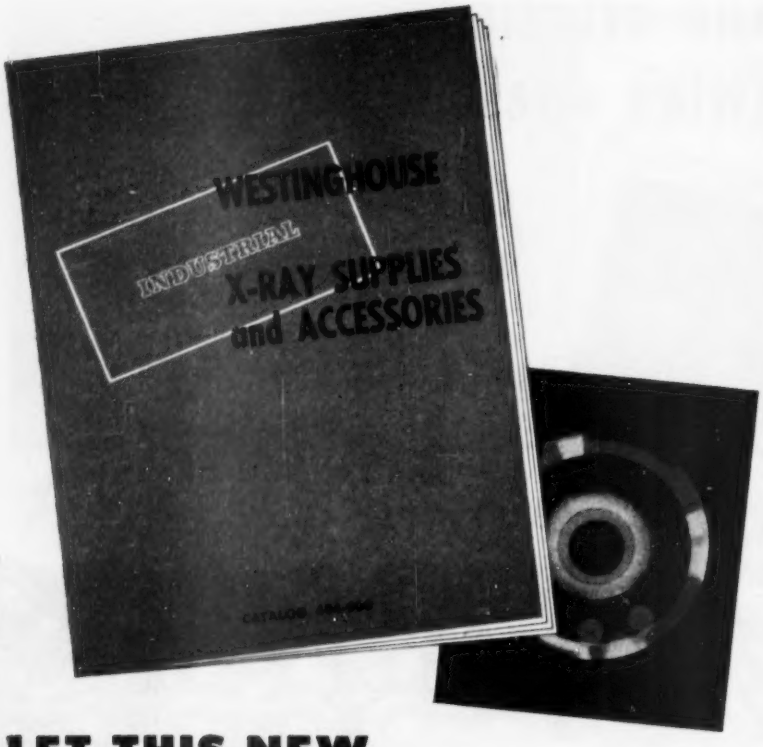
Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER



LET THIS NEW WESTINGHOUSE CATALOG INCREASE X-RAY EFFICIENCY

Better, cheaper, faster radiographic testing is a product of trained personnel plus proper equipment.

The new Westinghouse Industrial Supplies and Accessories Catalog has 44 pages listing over 600 items of film, chemicals, equipment, tools, and devices. The advantages and uses of each product are carefully explained.

In initiating, expanding, or refurbishing your radiographic program, call your nearest Westinghouse X-ray office (listed in the catalog or your phone book). There you will find men of wide experience who can help you toward an efficient, modestly priced arrangement.

Use the coupon or call your Westinghouse X-ray representative for a copy. It means faster, cheaper, better radiographs.

YOU CAN BE SURE... IF IT'S

Westinghouse

Westinghouse Electric Corporation
Industrial Application Dept. M-66
2519 Wilkens Avenue
Baltimore 3, Maryland

Gentlemen: —

Please send me a copy of the new booklet "Industrial X-ray Supplies and Accessories."

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

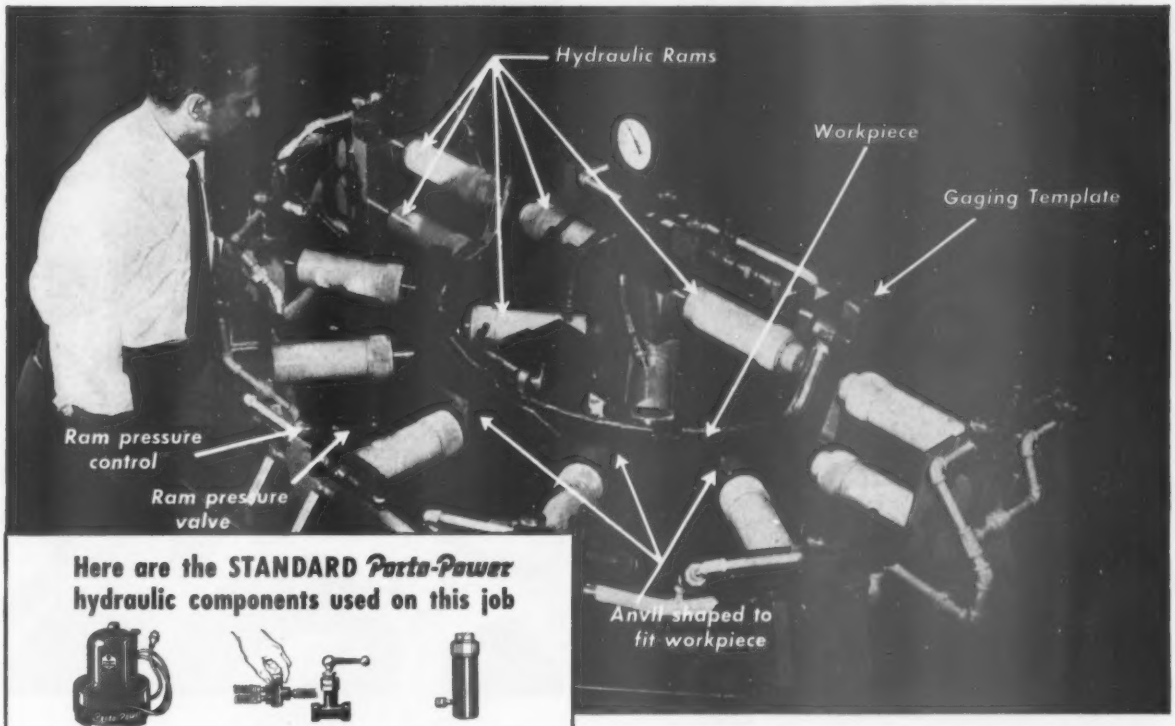
J-08266

It will be worth your while to turn to Pages 210-212 of this issue.

There you will find a completely revamped classified advertising section—revamped for your convenience and ease in locating the many opportunities listed.

Make sure that you check this section this month and every month.

How Porto-Power hydraulic tools save thousands of dollars on this PRODUCTION job



Here are the STANDARD Porto-Power hydraulic components used on this job

MOTOR-DRIVEN PUMP — contains own motor. Weighs only 84 lbs.

PRESSURE VALVES — For remote control of pump and positive ram shut-off.

20-TON CAPACITY RAM — Other available sizes: 4, 7, 10, 50-ton capacites.

Scores of other standard "Porto-Power" items are also cataloged and stocked by distributors

Illustration shows how Bell's engineers ingeniously applied "Porto-Power" to nacelle straightener. "Porto-Power" (trade-mark registered) is Blackhawk's name for a large line of standard hydraulic pumps, rams, valves, pressure hoses, connectors and attachments . . . all readily assembled *on the job* for push, pull, clamp, spread, press, lift or test operations.

WHEN idea men of industry team up with versatile Blackhawk "Porto-Power" hydraulic tools every one profits! Here's an example:

At Bell Aircraft, production of jet engine nacelles was slowed by a bottleneck in aligning saddles as they came from welding. But not for long! By combining standard "Porto-Power" components, idea men of Bell's production engineering department came up with this unique straightener. Now, they turn out several times the production and conserve valuable manpower. In the first three weeks, it saved Bell Aircraft thousands of dollars.

It's the same exciting story in plant after plant. Amazing adaptability of "Porto-Power" is revolutionizing scores of industrial and construction methods. Savings in time, money and materials are often spectacular. New safety and ease are being introduced to jobs formerly downright dangerous and back-breaking. Yet "Porto-Power" is surprisingly low in cost.

It's good business to know all about "Porto-Power" so you, too, can solve problems in production, testing or maintenance. It's described in the famous Blackhawk IDEA Book — available on request.

Products of Blackhawk Mfg Co., Dept. P-2753, Milwaukee 1, Wis.

BLACKHAWK

HYDRAULIC JACKS • "PORTO-POWER" • HAND TOOLS

IDEA MEN! **Here's how to get your free copy of the IDEA BOOK**

Ask "The man who knows" — your Blackhawk Industrial Supply Distributor — for this pictorial 64-page idea "gold mine," and all the facts on Blackhawk's big line of hydraulic equipment. Or write direct.

DRY PHOTOCOPIES AUTOMATICALLY!

ALL ELECTRIC!

APECO Systematic Auto-Stat

ONE UNIT DOES IT ALL!

Makes photo-exact copies direct from original letters, forms, bids, contracts, invoices, catalog sheets, reports, blueprints.

Yes—now a dry photocopy from any original in less than 45 seconds without any additional equipment. The Apeco Systematic Auto-Stat prints, processes and dries automatically . . . copies are ready for instant use. It saves up to 80% on copying jobs. Eliminates costly re-typing, hand copying, checking or expensive outside copying service. It's fast—only 2 steps will make legally accepted prints from any original up to 11 x 17 inches—printed on one or two sides.

SO LOW COST

A complete Apeco Systematic Auto-Stat installation is priced well within the budget of even the smallest firms. Remarkably low operation cost, too!

EXPOSE!

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COPIES PEEL APART!

MAIL TODAY!

HAVE YOU READ THIS NEW FREE BOOK?

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Please rush me, without obligation, your factual report on office copying. I understand this free booklet pictures and tells the complete Auto-Stat story and shows how I can use Apeco Auto-Stat in my office.

Name_____

Firm_____

Address_____ Zone____ State____

City_____

Manufactured in the U.S.A. by
AMERICAN PHOTOCOPY EQUIPMENT CO.

Offices in All Principal Cities
2849 N. CLARK STREET
CHICAGO 14, ILLINOIS

Users of Acadia Synthetic Rubber component parts in hundreds of industries have found them unsurpassed. No matter what function synthetic rubber must perform, depend on Acadia parts. They best meet exacting specifications and operating conditions such as moisture, oil, heat, wear and age resistance. Molded, extruded, die-cut to close limits—compounded to meet specific conditions. Acadia engineers will gladly cooperate.

- *Seals*
- *Gaskets*
- *Washers*
- *Cups*
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- *Strip*
- *"O" Rings*
- *Sheet*
- *Tubing*
- *Roll Goods*
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Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

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Processors of Synthetic Rubber and Plastics • Sheets Extrusions • Molded Parts

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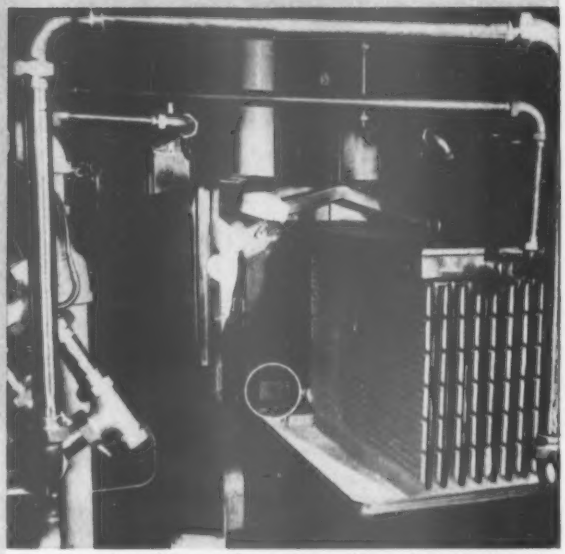
4035-4117 OGDEN AVENUE • CHICAGO 23, ILLINOIS

"Electron-eering" with photoswitch controls

Your next step in control-efficiency

Safety at her fingertips — photoelectric cell protects worker's hand at this punch press. Press starts instantly when hand is withdrawn, increasing production, cutting costs.



Sanitary Level Control — easy-to-clean electronic liquid level control maintains precise level of fluid milk, regardless of foam, in cooler at modern dairy.

New!
45 Case Studies

This book can save you money!

Right off the press! Crammed with new factual data and explanatory diagrams, this booklet tears aside all hocus-pocus and gives you a clear understanding of how electronic controls can solve your industrial problems. You'll find valuable tested ideas — broadly applied to industries — on achieving efficiency through "Electron-eered" counting, weighing, measuring, timing and cycling. Completely indexed. It can save you real money!

Offices in all principal cities

Beer coming up! — and photoelectric cells count each case unerringly, however closely spaced. Other controls provide completely automatic centralized distribution between storage areas and loading platform.

Photoswitch, Incorporated

Dept. FA 5 , 77 Broadway, Cambridge 42, Mass.

Send free, "Electron-eering to cut production costs".

Name ..... Title .....

Company .....

Address .....

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All business is specialized

. . . and nothing specializes on your business like your business paper

Here's a smart bird who knows how to sell fast. He *specializes* . . . picks cold customers who are hot prospects!

Specializing is profitable in your business, too. That's why this business paper of yours is so important. It means no frustrating scrounging for facts you need. A whole staff of editors scouts the country for you . . . and lines up new ideas, the facts about new products and materials, the profit slants on your business—in article after article—like a row of sittin' ducks.

And the ads help, too! They talk business . . . your business . . . helping you slice a cost here, an hour there . . . showing you new products, explaining new techniques, telling where to buy what. Like you, all the best informed people in your field read them carefully, clip and file them for reference . . . pass them along. Fact is, there are few ways for people-moving-ahead to get so much data for so little . . . or to find so much *specialized* help anywhere as you get in your business paper every single month.

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A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet." Room 2710.

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd St., New York 36, N. Y.

One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

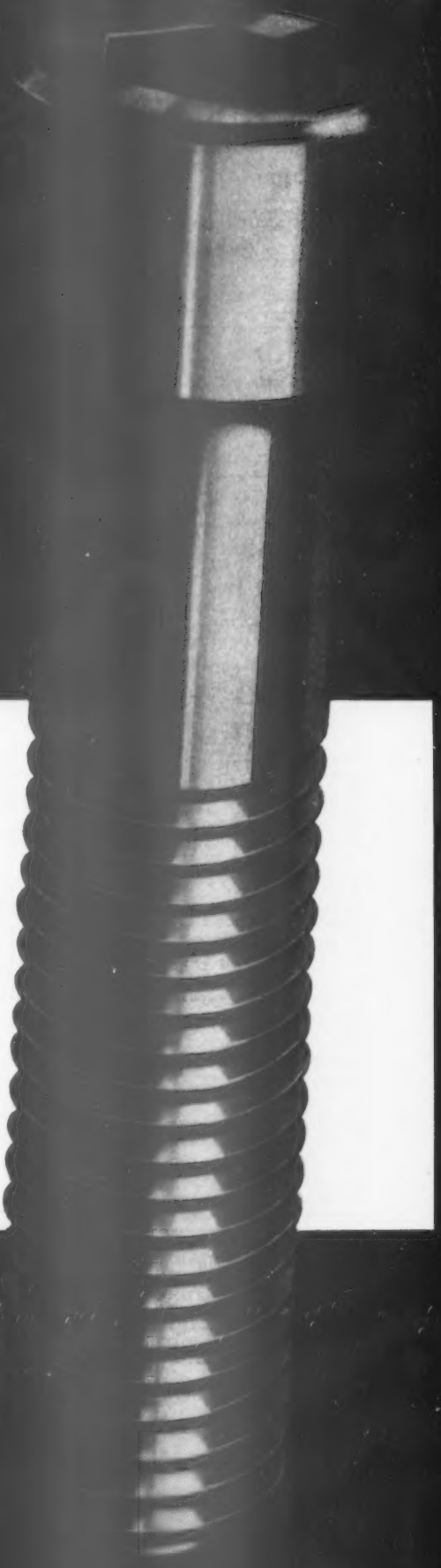
EXTRA *inventory*

EXTRA *men*

EXTRA *service*

at no extra cost . . .

YOUR B-RIGHT-ON SOCKET SCREW DEALER



Sure, you expect delivery and service from your industrial distributor, but you will find there's something EXTRA about the service from your Brighton Socket Screw Distributor—an extra interest in your fastener needs, extra desire and ability to fill those needs.

EXTRA INVENTORY—When you need socket screws, he has them or will get them quickly from centrally located factory stocks.

EXTRA SERVICE—When you need technical help on fasteners, he has at his disposal factory engineers, Brighton's field men, to help you.

EXTRA QUALITY—His line of Brighton Socket Screws is tops in quality, meeting the highest standards of strength, accuracy and uniformity.

Take advantage of all the EXTRAS your Brighton distributor offers. If you are not already acquainted, write for his name.

QUALITY B-RIGHT-ON PRODUCTS

B-RIGHT-ON

THE BRIGHTON SCREW & MANUFACTURING COMPANY

Reading Rd. opp. Deer Creek Cincinnati 2, Ohio

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Costs **Management** **Inspections**
Research **Accounting** **Motion Studies**
Expert Advice on All Industrial Problems

If you have a plant management problem, contact the appropriate consultants whose cards appear on this page. The offering of their special services nationally justifies your confidence in their ability to give you competent counseling that can effect appreciable SAVINGS for you.

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Management Consultant
Organization — Work Simplification
Cost Reduction — Wage Incentives
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A. L. KRESS
Management Consultant
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Supervisory Training — Production Control
Salary and Wage Administration
Preparation of Cases for Labor Arbitration
189 Springdale Road — Princeton, New Jersey
Phone Princeton 1-4310

DRAKE, STARTZMAN, SHEAHAN and BARCLAY
Distribution and Materials Handling Consultants
"Control, Movement and Storage of Materials"
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McCORMICK & COMPANY
Management Engineers
PROFIT LEAKS
How to Find Them and Plug Them
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Phone Yonkers 8-7600

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METHODS ENGINEERING COUNCIL
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CONSULTING
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Over 20 Years Experience
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Industrial and Management Consultants
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Consulting Mechanical Engineers
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Redesign Existing Products for Greater Profit
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WHEELER ASSOCIATES, INC.
- ***Cost Reduction Training Programs***
- ***Work Conferences***
- ***Operating Consultants***

15017 Detroit Ave. — Cleveland 7, Ohio

INACCESSIBLE

Are some of your prospective clients in spots where it is hard—or impossible—to contact them? If so, then a card in this Section may well be the solution to your problem.

Every month in

FACTORY

. . . . .

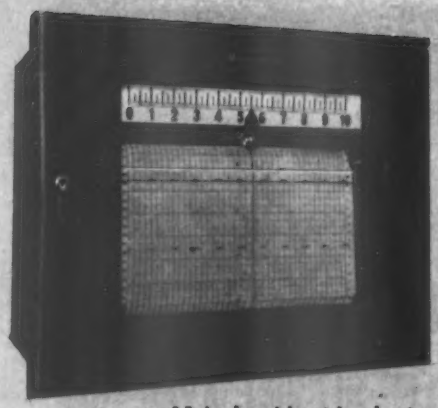
Look for "PLANT ENGINEERING PROBLEMS"

You'll find plenty of quick tips to new and better ways to solve plant engineering problems.

It's another

FACTORY

feature



11-inch-wide strip chart

28-inch-long scale

"12 o'clock" control check

Since 1940 —

Laboratory accuracy for *production control...* with *ElectroniK* instruments

FOR the last fourteen years *ElectroniK* instruments have been an important part of the industrial scene . . . for they were the first to bring high-speed, continuous measurement and control into practical reality in industry.

They made news then, by placing laboratory accuracy in the hands of production men . . . permitting them to achieve improvements in quality and efficiency that can be obtained only through more exact process control. And they're still making news today . . . helping to guide complex, precise, process operations.

These versatile instruments can measure, and often control, practically any process variable . . . temperature, flow, pH, conductivity, humidity, weight and dozens of others. They are available as indicators, recorders, and electric or pneumatic controllers . . . in many control variations, capable of handling the toughest assignments.

An outstanding record of dependability, accuracy and ease of maintenance has earned *ElectroniK* instruments an enviable reputation of accomplishment throughout industry. This stems from rugged, service-tested design of every component . . . design that assures uninterrupted service, optimum operation.

Your local Honeywell engineering representative will be glad to discuss how *ElectroniK* instruments can help in your lab or plant. Call him today . . . he is as near as your phone.

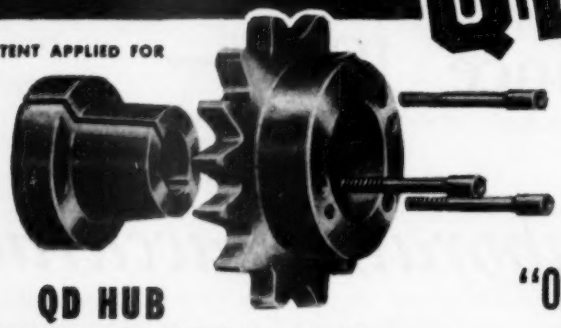
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4461 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

FORT WORTH QD ROLLER CHAIN SPROCKETS

WITH TAPERED SPLIT HUB

PATENT APPLIED FOR

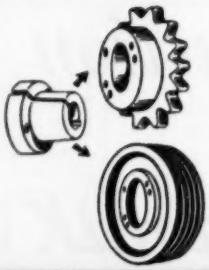


ELIMINATE REBORING!

QD HUB ALSO FITS QD V-Belt Sheave

Speed changes are simplified and "spare" sprockets can be carried more easily.

If your favorite distributor doesn't stock this new item, tell him about it. He'll reward you with better service.



"OFF THE SHELF" SERVICE AVAILABLE FROM INDUSTRIAL DISTRIBUTORS

Reboring of stock bore sprockets to fit various shafts is eliminated due to the various bores available in the QD hub. Installation and removal from the shaft is made easy by the tapered fit of the hub and sprocket. Hub assembly grips the shaft equivalent to a "press fit."

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SCREW CONVEYORS and ACCESSORIES
SCREW ELEVATORS
INDUSTRIAL FANS

FORT WORTH STEEL & MACHINERY CO.
Dept. 65, 3600 McCart Street FORT WORTH, TEXAS

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

EMPLOYMENT SERVICE

SALARIED PERSONNEL $3,000-$35,000. This confidential service, established 1927 is geared to needs of high grade men who seek a change of connection under conditions assuring if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. D, 241 Orange St., New Haven, Conn.

EXECUTIVES—CONTEMPLATING a change? Your personal requirements met thru our flexible procedures, affording full protection of your present position. We have the know-how and the nationwide contacts to negotiate successfully for you. Details on request, mailed under confidential cover. Jepson Executive Service (Est. 1939), 1043 Porter Bldg., Kansas City 2, Mo.

POSITIONS WANTED

REGISTERED ENGINEER, Age 37, 14 years Experience in diversified industry including Production Supervision, Methods Improvement, Time and Motion Study, Maintaining and Installing Wage Incentives and Job Evaluation Programs in complete plants, Cost Analysis, Labor Relations including Contract Negotiations, Plant Engineering including Plant Layout, Machine Design, Material Handling and Maintenance. Desires position as Plant Manager of medium sized organization or management position with opportunities in relation to ability. Salary minimum $12000 to start. PW-7609, Factory Management & Maintenance.

PRODUCTION MGR.—Plant Supt. 12 yrs. exp., married, 36, college, take full charge mfg., pkg. and planning. Knowledge of costing, quality control. Chemical specialties mfg. and pkg. Seeking perm. position Northeast U.S. PW-7611, Factory Management & Maintenance.

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COULD YOU use this executive? Management Engineering degree. Has been employed as Industrial Engineer, Production Consultant, Assistant General Manager and Presently Chief Industrial Engineer. Age 33. Complete resume upon request. PW-7593, Factory Management & Maintenance.

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Time Study Equipment

Boards with U.C.E.Z. transparent watch holders, stop watches. Pedometers, Slide Rules. Time study forms in stock. Sample kit free. Oznam Products Co., 5544 So. Homan Ave., Chicago 29.

Specialized Repairing

of Stop Watches—Timers—Chronographs—watchman's clocks—automatics, etc. Mail yours for free estimates. Reliable Watch Repair Service, 8030 Williams Ave., Phila. 19, Pa.

CHIEF TOOL ENGINEER
START $12,000 to $15,000
National metal fabricating—sheet metal—seeking aggressive man to head up tooling over 4 plants—7000 employees.
CONTACT RAY EDWARDS
O'SHEA EMPLOYMENT SYSTEM
"America's Largest"
64 E. Jackson, Chicago, Ill. Tel. WAbash 2-1884

SALARIED POSITIONS $3,500 — $35,000
We offer the original personal employment service (established 43 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars.
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EXECUTIVES AND TECHNICAL MEN
Desiring Positions with Stability
We solicit inquiries from qualified candidates who desire to contact employers for positions paying $5000 to $25,000 per year. Confidential. Est. 36 years.
(Inquiries from Employers entail no obligation)
THE NATIONAL BUSINESS BOURSE
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SETTLED
Commercial and Industrial Concrete Floors and Airport Runways. Raised and Stabilized by Hydraulic Pressure. 15 yrs. experience.
LEE AND COMPANY
Lee Garell, *Mgr.*
4545 De Tonty St. Louis 10, Mo.
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MECHANICAL
ELECTRICAL
GAS

WANTED BY RAPIDLY GROWING ELECTRIC AND GAS COMPANY ON EAST COAST

Experienced Engineers required in Engineering Department for expansion program covering Steam Power Plants, Electric Generation, Transmission and Substations and Gas Production and Transmission. Jobs offer permanent employment with ample advancement opportunities for men with ability and initiative.

Pleasant congenial suburban community in close proximity to a Metropolitan Area.

Write giving full particulars of education, experience, and salary to:

P-7310, Factory Management & Maintenance
320 W. 42 St., New York 36, N. Y.

When required personal interviews will be arranged for evenings or Saturdays.

WANTED
INDUSTRIAL ENGINEER

Excellent opportunity for a graduate industrial engineer with a leading acetate yarn producer.

The position is a permanent one in a growing organization and offers a real challenge to an ambitious man. One or two years' industrial engineering experience preferred, including experience in making cost reduction studies, time and motion studies, and setting work standards.

State education and experience in application letter.

P-7253, FACTORY MANAGEMENT & MAINTENANCE
330 W. 42nd St., New York 36, N. Y.

FOR SALE

USED TOLEDO PRESS

Model 57A, 126 ton, single back-geared press with 140 ton air cushion. Good condition.

PAINT SPRAY BOOTH

Peters-Dalton twin water wash screen production spray booth complete, slightly used.

FS7535, Factory Management & Maintenance
520 N. Michigan Ave. Chicago 11, Ill.

2 TELEPHONES $25.95

Inter-communication handsets, two wire system. Included Two 3 volt batteries, 50 ft. of wire and simple wiring instructions. Additional wire 1 cent per ft. or $25.00 per mile. Complete list of telephone parts, handsets, magneto—common battery — and dial telephones, switchboards, etc. Write:

Telephone Engineering Co., Dept. S, Simpson, Pa.

New "SEARCHLIGHT" Advertisements received by May 18th will appear in the June issue subject to limitations of space available.

Classified Advertising Division
Factory Management & Maintenance
330 West 42nd St. New York 36, N. Y.

PLANT MANAGER
With Mfg. V.P. Potential

A leading, metal products manufacturer has a challenging opportunity for an experienced Plant Manager.

Our company possesses an enviable record of profitable operations and is located in a desirable city. Sales exceed $50,000,000.

$25,000

This position offers an exceptional future to an ambitious manufacturing executive in the age range of 40 to 50 years, who would like to be a member of a hard-hitting successful management team.

Replies may be brief, should include age, current compensation, home telephone and will be treated in strict confidence.

P7596, FACTORY MANAGEMENT & MAINTENANCE
330 W. 42 St., New York 36, N. Y.

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FOR SALE

6—1000 KVA Mol. 11500—2400/4160Y
3— 500 KVA Pitts 22000—2300/4000Y
3— 500 KVA G-E 22000—2300/4000Y
3— 333 KVA W-H 6600—2300
3— 200 KVA G-E 22000—2300
3— 200 KVA Mol. 3450—2300
3— 150 KVA G-E 44000—600/2400
3— 150 KVA G-E 19050/33000Y—2540/4000Y
3— 150 KVA A-Ch. 13800—2400/4160Y
2— 150 KVA G-E 6900—230/460
3— 100 KVA G-E 33000—6900/11950Y
3— 100 KVA G-E 13200—2300
3— 50 KVA A-Ch. 33000—6900/11950Y
3— 50 KVA A-Ch. 33000—2400/4160Y
3— 50 KVA A-Ch. 13200—2300/4600

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.
CINCINNATI 27, OHIO
40 Years Dependable Service

WORLD'S LARGEST INVENTORY

MOTORS-GENERATORS-TRANSFORMERS
New and Guaranteed Rebuilt
1 H.P. to 3500 H.P.
ELECTRIC EQUIPMENT CO.
P. O. BOX 51, ROCHESTER 1, N.Y.

Methods,
Process Engineers

Interested in a man-sized job?

If you're an experienced engineer who's looking for a man-sized job, investigate the challenging openings now available at Honeywell.

The prime force behind the 20th century industrial revolution is automatic control. Here at Honeywell it's meant that we have been, and will continue to be, faced with an ever greater production job. That's why we have a real need for "engineers of production."

Duties of the jobs. Figure ways to make quality products at minimum cost. Supervise the tooling, processing and planning necessary to transform blueprints into finished products.

Requirements. B. S. or M. S. in Mechanical, Electrical, Industrial or Chemical Engineering.

Atmosphere. A company which is growing rapidly, steadily and soundly.

Openings. In Minneapolis and Philadelphia.

For details write Mr. Ross Wagner, Personnel Dept., FM-5-86, Honeywell, Minneapolis 8, Minnesota. And be sure to ask for our new book, "Emphasis on Research."

MINNEAPOLIS **Honeywell**

First in Controls

Additional For Sale Advertising on the following page.

MACHINE TOOLS

AUTOMATIC SCREW MACHINES

⅜" Cap. Ceco (2), Swiss type. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

½" (3) & ⅝" (1) Conomatic, late type. Tri Mach. & Tool Co., 248 Lafayette St., New York, N. Y.

1" Acme Gridley No. RA-6, 1942, many accessories, $9950.00. Coastal Mach'y Sales 1775 B'way, NYC.

1¼" Cap. Brown & Sharpe No. 2G (2). Also Nos. 0G (9) & 00G (6). Aaron Machinery Co., 47 Crosby Street, New York 12, New York.

1⅝" Cap. Cleveland Model AA. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

1⅞" Cap. Conomatic, 4-spindle. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

1⅝" Cap. New Britain Gridley No. 61, 6-spindle. Aaron Mach'y Co., 47 Crosby St., N. Y., N. Y.

BORING MACHINES

Amer. Mach. & Fdy Mod. 4947, 5"-6" Cap., 4 speed, auto. return, 1943. Harris Machinery Company, 501 30th Ave. SE, Minneapolis, Minnesota.

BORING MILLS

Vert: 96" Niles, 2 head, rapid traverse, chuck blocks. Harris Machinery Company, 501 30th Ave. SE, Minneapolis, Minnesota.

Vert: 144" Niles MD, 2 heads. This machine excell. cond., taken out of operation. Botwinik Bros. Inc., Welton Parkway, New Haven, Conn.

BROACHES

Vert. Hyd.: 12 ton American No. V50, pull type, late machine, taken out of operation. Botwinik Bros. Inc., Welton Parkway, New Haven, Conn.

BUFFING MACHINES

No. 5D Gardner, Dble. end, 3/60/220V, 15 HP motor drive each spindle, Serial #10506, good cond. Carell Mach'y Co., 503 McCarter Hwy., Newark, N. J.

CHUCKING MACHINES

21" Potter & Johnson No. 4D, MD high speed, excell. cond. Botwinik Bros. Inc., Welton Parkway, New Haven, Connecticut.

ENGRAVING MACHINES

Nos. 1D & ME Models Gorton. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

No. 3Z Model Gorton, chuck, dividing head, centering tool & boxes letters. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

Nos. G1, G1L, & GK2 Deckel. Aaron Machinery Co., 47 Crosby Street, New York 12, New York.

FORGING MACHINES

Hammers: 6000#, 3500#, 2000#, 1500#, 750# and 500# double steam forging. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, N.J.

GEAR CUTTING MACHINES

Hobber: No. 3 Newark Universal (1943). Fairfield Equipment Co., 60 Sanford St., Fairfield, Conn.

Shaver: No. 18 Fellows, brand new, 2/3 factory price. Coastal Mach'y Sales, 1775 B'way, N.Y.C.

GRINDING MACHINES

Centerless: No. 4 Cincinnati, Serial #3M4H1E-4, regulating wheel, hydraulic truing attach., change wheels, very good condition, $5950.00. Jayco Machine Co., 136 Liberty St., New York 6, N. Y.

Centerless: No. 4 Cincinnati, MD with thru-feed attach. Botwinik Bros. Inc., Welton Parkway, New Haven, Connecticut.

Cylindrical: No. 2 Brown & Sharpe Univ., new 1944, fully equipped, guaranteed. Centre Mach'y Co., 249 Centre St., N. Y. 13, N. Y. CAnal 6-6997.

Cylindrical: 6" x 18" Norton type C. Fairfield Equipment Co., 60 Sanford St., Fairfield, Conn.

Surface: No. 16A Blanchard MD, vert, dial loading. Botwinik Bros. Inc., Welton Pkwy., New Haven, Conn.

LATHES

20"x54" cent. Reed-Prentice, geared head, QC gear, 16 speed. Botwinik Bros. Inc., Welton Pkwy., New Haven, Connecticut.

20"x14' bed Hendey, MD, geared head engine. Botwinik Bros. Inc., Welton Pkwy., New Haven, Conn.

24"x10' Bed Lodge & Shipley, 12 speed select. head, geared engine. Botwinik Bros. Inc., Welton Parkway, New Haven, Connecticut.

Heavy Duty: LeBlond, swing 25/50x96" centers, sliding bed gap, plain & compound rests, tool post, face plates, 10 HP/220/3/60 motor. Aaron Mach'y Co., 47 Crosby St., New York 12, N. Y.

Heavy Duty: American, 30"x120" centers, geared head, excellent condition. Wigglesworth Industrial Corp., 196 Bent St., Cambridge 41, Mass.

Turret: 1¼" Simmons Micro-Speed, Serial #4112, motor in base, infinitely variable speeds 44-750 RPM, powerfeed turret, very good condition. Jayco Machine Co., 136 Liberty St., New York 6, N. Y.

Turret: 3" & 5" Cap. Libby. Aaron Machinery Co., 47 Crosby St., New York 12, N. Y.

Turret: No. 2A W & S Univ., 1941, chuck tooling extra long bed, excellent condition. Coastal Mach'y Sales, 1775 Broadway, New York 19, N. Y.

Turret: No. 3L Gisholt Universal (1942). Fairfield Eqpt. Co., 60 Sanford St., Fairfield, Conn.

Turret: Nos. 5, 4, 2, & 1A Warner & Swasey. Aaron Machinery Co., 47 Crosby St., New York 12, N. Y.

Turret: Nos. 5 (Bar Feed), 4R (9¼" Spindle hole), & 2L Gisholt. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

Turret: Nos. 7, 5, 3, & 2 Bardons & Oliver. All bar feed. Aaron Machinery Co., 47 Crosby Street, New York 12, New York.

MILLING MACHINES

Hor. & Vert., Hall, Snyder & Foote-Burt. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, N. J.

Production: No. 5 Cincinnati—60 plain hydromatic, 60" table traverse, late type. United Mach'y & Tool Corp., 89 Central St., Worcester 8, Mass.

Production: No. 12 Brown & Sharpe, plain, MD. Botwinik Bros. Inc., Welton Pkwy., New Haven, Conn.

Production: No. 08 Cinci., rise & fall, 1942, excell. condition, $3640.00. Coastal Mach'y Sales, 1775 Broadway, New York 19, N. Y.

Production: No. 08 Cincinnati, Pl. Horiz., MD, with rise and fall attach (several). Botwinik Bros. Inc., Welton Pkwy., New Haven, Conn.

Vertical: No. 1 Cleveland, new 1944, similar to Bridgeport AC motor, excell. cond. Tri Machine & Tool Co., Inc., 248 Lafayette St., N. Y., N. Y.

Vertical: No. 2K K & T, power down to head, power feed & rapid traverse throughout, late type. United Machinery & Tool Corp., 89 Central Street, Worcester 8, Massachusetts.

POWER PRESSES

50 ton No. 5 V&O, Inclinable, 2" stroke, geared. Hyman Press Sales Corp. 225½ Lafayette St., N.Y.C.

125 ton No. 3½B Bliss, Toggle, 15½" draw Stroke. Hyman Press Sales Corp., 225½ Lafayette St., N.Y.C.

250 ton No. 95½B Toledo, Double Crank, 61" wide. Hyman Press Sales Corp., 225½ Lafayette St., N.Y.C.

SHAPERS

16/20" Industrial Gould & Eberhardt, late model, reconditioned & guaranteed. Wigglesworth Industrial Corp., 196 Bent St., Cambridge 41, Mass.

THREADING MACHINES

Miller: No. 3 Plan-O-Mill, 8" OD & ID Cap., 1944, 12 & 18 pitch lead screws, used 6 mos. Carell Mach'y Co., 503 McCarter Hwy., Newark, N. J.

ELECTRICAL / POWER EQUIP

BOILERS

50,000# B & W, integral furnace, 275# oil burning, new 1949. A. Lee Ellis Co., 50 High St., Boston, Massachusetts.

COMPRESSORS

Air: 478 Cu. Ft. Disp. Sullivan, 14x18¾x10, angle compound, WJ-3. Harris Machinery Company, 501 30th Ave., SE, Minneapolis, Minnesota.

CONDENSERS

400 Sq. Ft. Allis Chalmers, New. Also Heat exchangers and Coolers. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

DIESEL ENGINES

Twin: 6-71 GM. Reconditioned and reprocessed by GM, As good as new. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

GENERATORS

AC & DC: From 40 KW to 210 KVA, Diesel Driven. Eastern Scrap & Salvage, 65 Muirhead Ave., Trenton, New Jersey.

DC: 1000 KW Allis Chalmers, 250/275 Volts, Synchronous Motor Driven, 3 Ph., 60 Cy., 2300/4000 Volts AC. Also 300 additional MG Sets in Stock. L. J. Land, Inc., Established 1910, 136 Grand Street, New York 13, N. Y. Phone: CAnal 6-6976.

DC: 1200 KW Allis Chalmers, 525 Volt, 750 RPM. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

Turbo: 1000 kw GE, non-cond., 200# 15/25 BP, 4160V., new 1949. A. Lee Ellis Co., 50 High St., Boston, Massachusetts.

Turbo Sets AC: 200 kw GE, 3 Ph., 60 Cy., 440 V. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

LINE STARTERS

440 volt AC, Magnetic, 7½ HP Ward Leonard (600). Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, N. J.

MOTORS

DC: 1500 HP Westinghouse, 525 Volt, 600 RPM, reversible. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

Gear Head DC: 1½ HP Reliance, 230 V., 48-290 RPM Output; 2 HP Reliance, 230 V., 640 RPM; 2 HP Reliance, 230 V., 350 RPM; 7½ HP Reliance, 230 V. 48-290 RPM. Harris Machinery Company, 501 30th Ave., SE, Minneapolis, Minnesota.

Synchronous: 3800 H GE, 3 Ph., 60 Cy., 1700 V. 257 RPM, Reversible. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

PUMPS

Boiler Feed, Centrifugal, Turbine & Motor Driven. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

Vacuum: Kinney size 12—8—14. Superior Equipment Co., 140 Grand Street, New York 13, N. Y.

Vacuum: 10"x4", 14"x7", & 24"x11". All Ingersoll Rand. Harris Mach'y Company, 501 30 Ave. SE, Minneapolis, Minnesota.

RECTIFIERS

6 or 12 Volt Hanson Van Winkle (7), 500 Amp. 440 Volt, copper oxide plate type. Harris Machinery Company, 501 30th Ave. SE, Minneapolis, Minn.

REDUCERS

Speed: 26 HP Falk Herringbone (4), M.O. 11-473, 183-1; 50 HP Falk Herringbone (1), 11RX, 187-1. Harris Machinery Company, 501 30th Ave. SE. Minneapolis, Minnesota.

REDUCTION GEARS

Up to 2670 HP. Westinghouse, GE, Falk, etc. Eastern Scrap & Salvage Corp., 65 Muirhead Ave., Trenton, New Jersey.

TRANSFORMERS

200 KVA GE, 1 Ph., 60 Cy. 2300/4000Y-460/230 V. Archer & Baldwin Inc., 75 West St., N.Y. 6, N.Y.

333 KVA GE, 1 Ph., 60 Cy. 2300/4000Y-460/230 V. Archer & Baldwin Inc., 75 West St., N.Y. 6, N.Y.

VALVES & FITTINGS

All sizes and pressures, Flanged and Weld end. H. P. Sherman Co. Inc., 210 Kent Ave., Bklyn, N.Y.

MATERIAL HANDLING EQUIP.

DIE LIFTERS

1 ton Cap. Lyons-Raymond, Port., 2 stage & hydr. pump, plat. 5'x3', raises 30" to 60". Carell Machinery Co., 503 McCarter Hwy., Newark, N.J.

LIFT TRUCKS

3 ton cap. Yale, 60"x26" plat., ready power, lifts 12" to 60", model K25-6, Ser. #42015. Carell Mach'y Co., 503 McCarter Hwy., Newark, New Jersey.

5 ton cap. Automatic, 60"x26" plat., ready power, lifts 12" to 60", Mod. TLO-5NU, Ser. #13666. Carell Mach'y Co., 503 McCarter Hwy., Newark, N.J.

MATERIALS & PARTS

FASTENERS

Nuts, Bolts, Screws, Elastic Stop Nuts, Immediate Delivery, Priced Below Market. Industrial Bolt & Supply Co., 212 W. Bigelow, Newark, New Jersey.

WANTED

Surplus or obselete items—Any quantity. S. Huberman, 77-79 North 12 St., Bklyn 11, N.Y. Phone: EVergreen 7-3277.

Americans Are Rolling Up Their Sleeves!

YES, ALL KINDS OF PEOPLE ARE GIVING BLOOD SO THAT OUR WOUNDED MAY LIVE!

• Today, the blood of a Boston bookkeeper may be flowing through the veins of a wounded kid from a Kansas farm . . . the blood of a pretty Southern housewife may have saved the life of a grizzled leatherneck. For, blood is blood, a God-given miracle for which there is no substitute . . . and when a man's life hangs in the balance and blood is needed, there is nothing else to take its place!

Right now the need for blood is urgent. In hospitals —at home and overseas— many men require four and six transfusions during delicate operations. And the blood *must be there*—when it's needed. So give the most precious gift of all—*your* blood!

Be assured that giving blood is neither difficult nor distressing. And what a thrill there is in knowing that you've performed a really unselfish act! So call your local American Red Cross today and make an appointment. And tell your friends and neighbors about your experience. Let them share the wonderful feeling Americans get when they roll up their sleeves—and give blood.

But—

WHAT HAPPENED TO THAT PINT OF BLOOD YOU WERE GOING TO GIVE?

Call Your American Red Cross Today!

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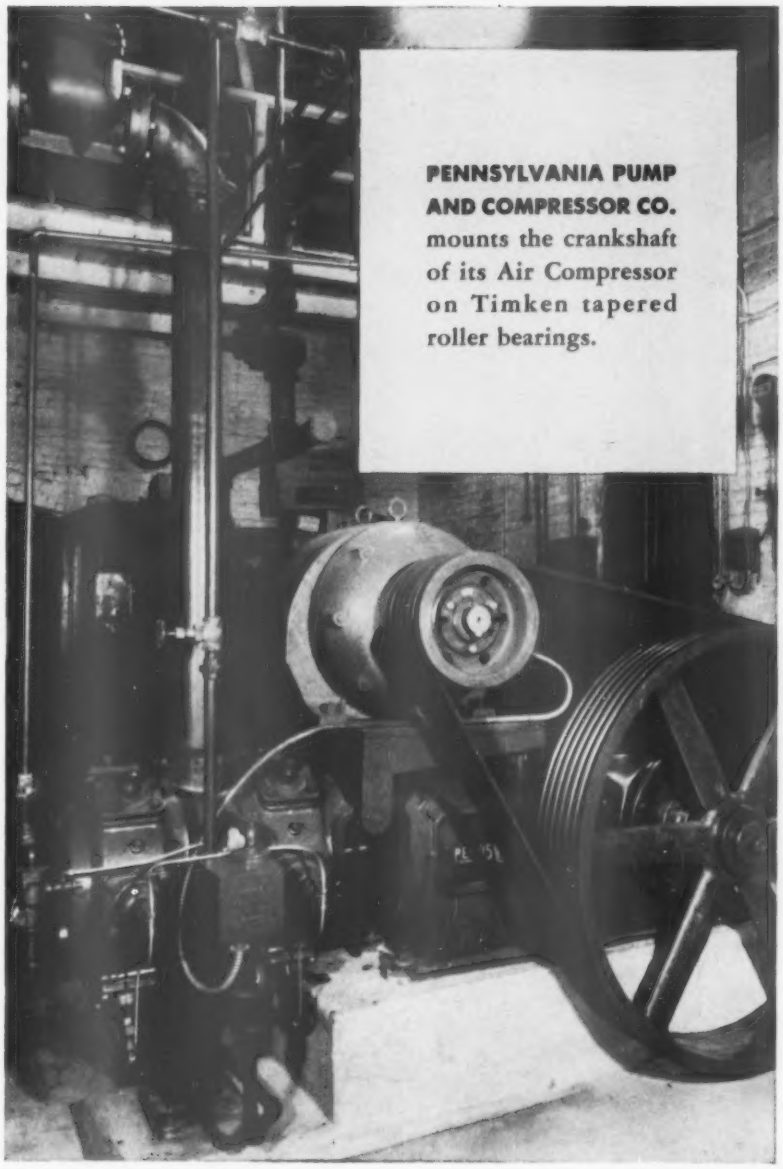

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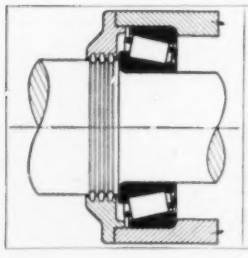

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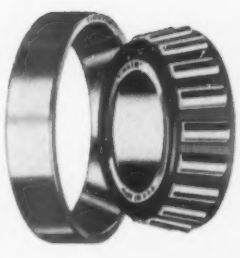

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